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PC WORLD

November 1993 $3.95

Brand Name vs. No Name

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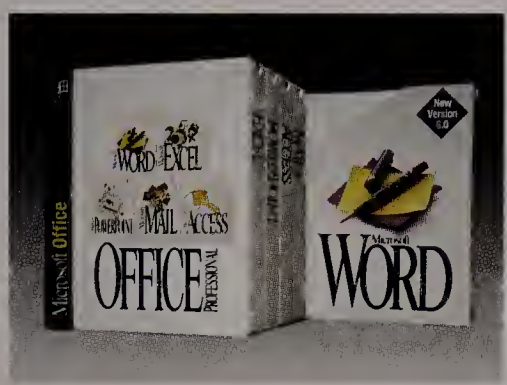

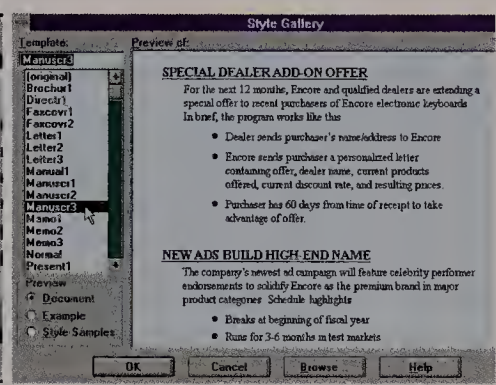

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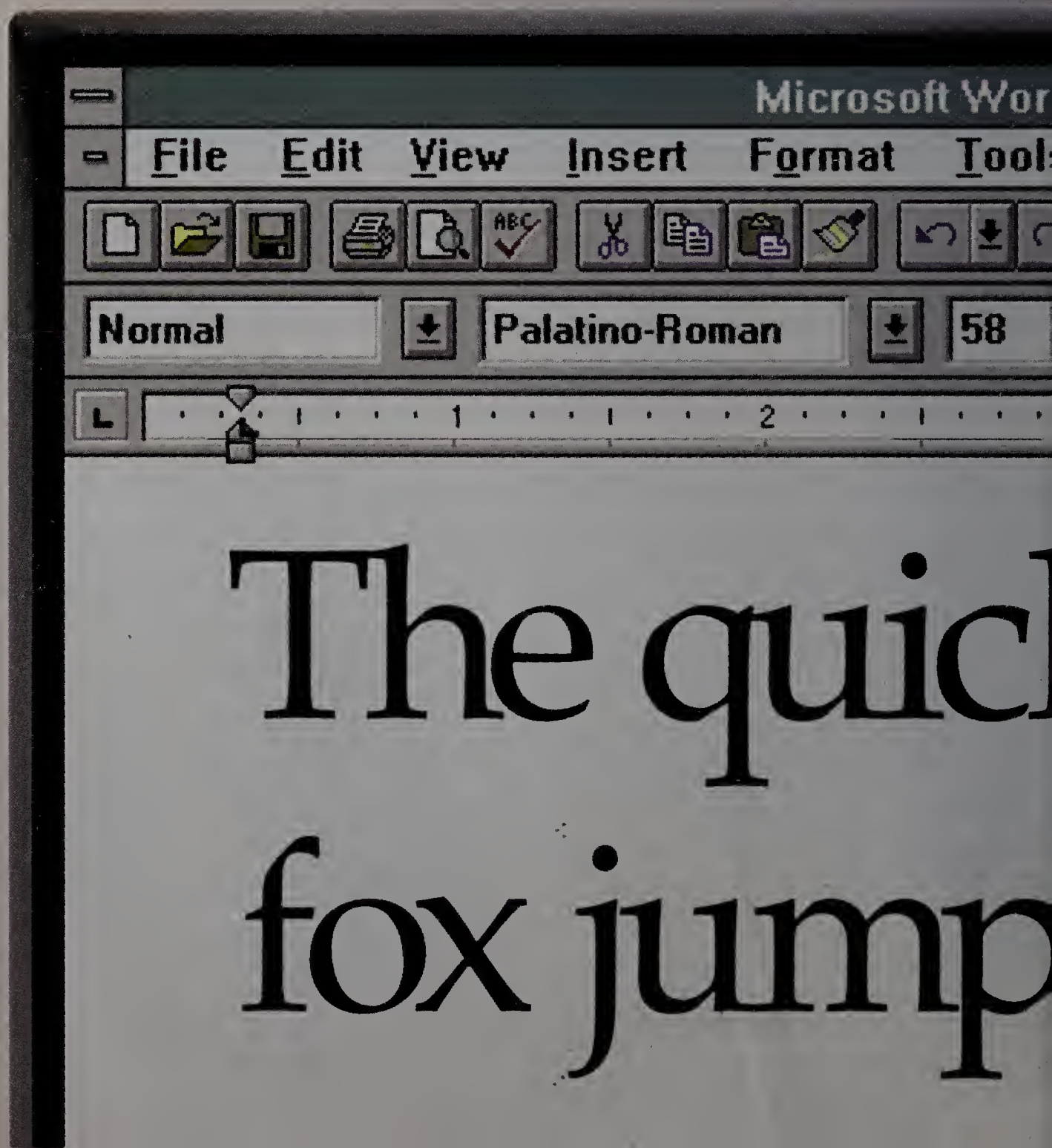

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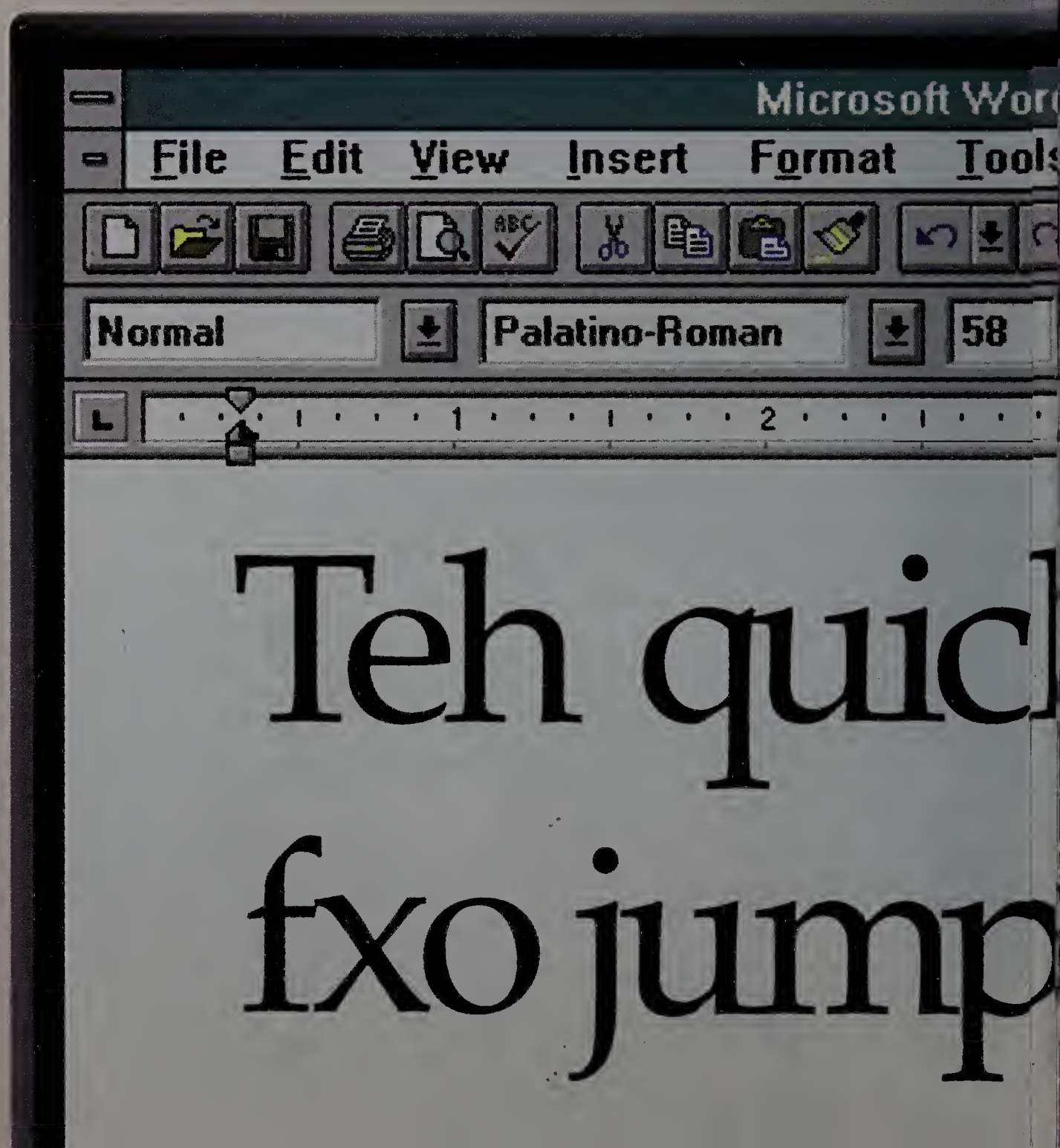

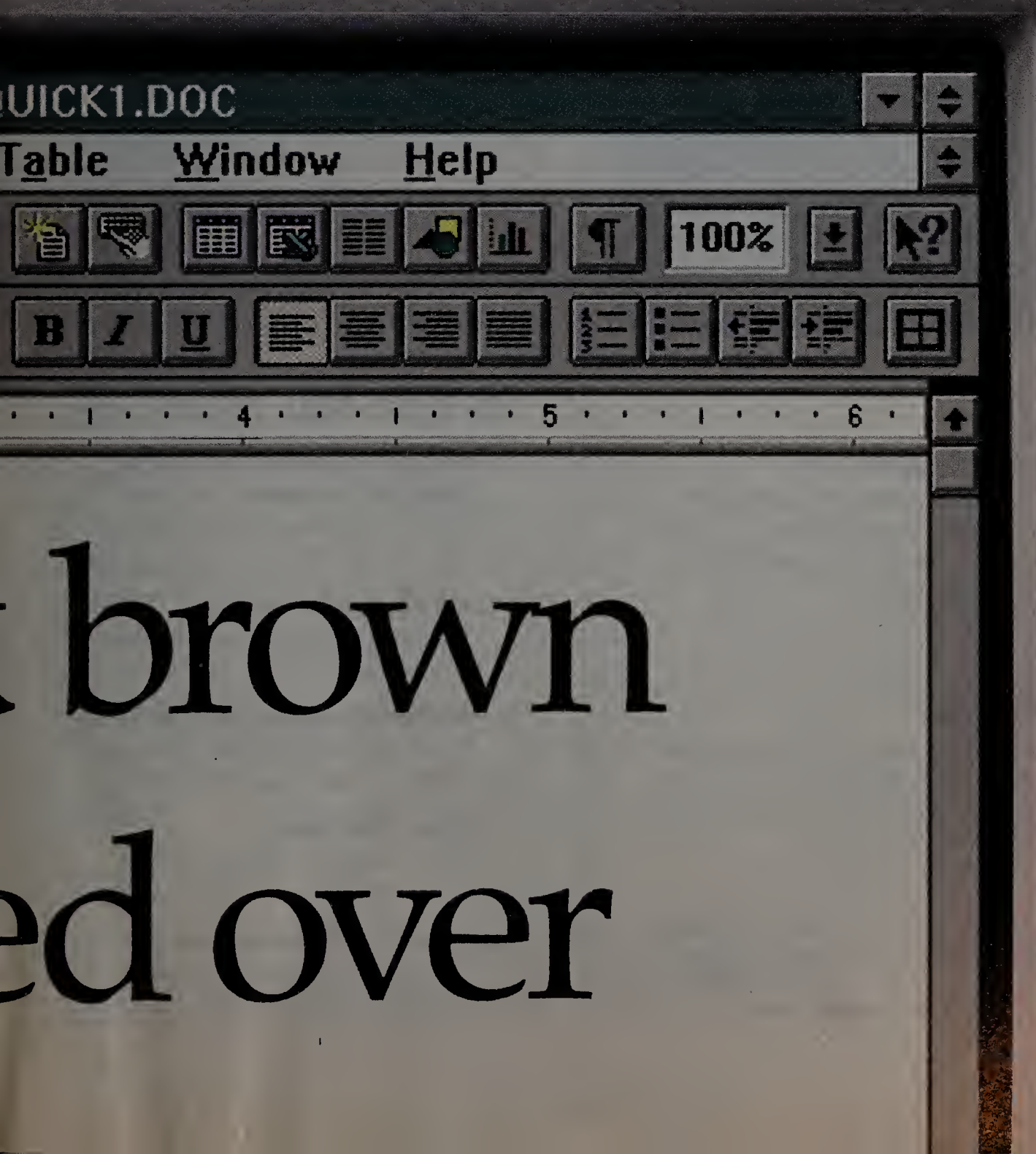
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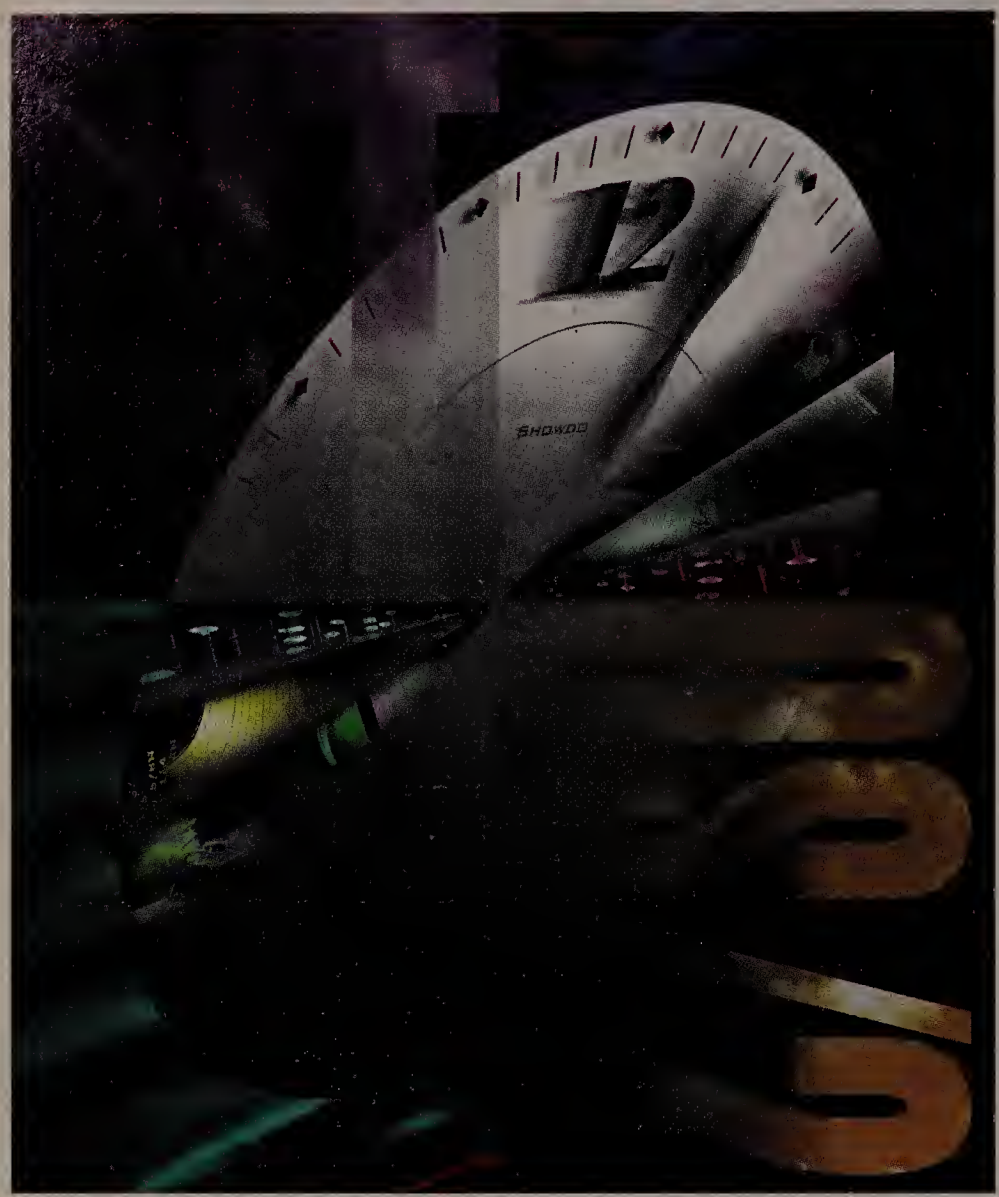

Special Report:

142 Brand Name vs. No Name
As national brands fight back with aggressive prices and top-notch PCs, does it still make sense to buy a storefront 486 clone? We shopped, we tested, and we talked to buyers nationwide. The result: our comprehensive guide on where and how to buy your next 486 PC.

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144 486 Face-Off: Local Heroes or Little-Town Blues?
Our shoppers rounded up 5 locally built 486DX2-66s from Boston, Miami, Chicago, San Francisco, and Los Angeles. Our Test Center put them and 19 brand name PCs through its rigorous real-world tests. Our editors chose the Best Buys. Did the local store PCs make the cut?

Windows NT and OS/2

232 Showdown on the Desktop: NT Challenges OS/2 2.1
For months, we waited for NT to hit store shelves. The moment it arrived, we enlisted two power users to give up Windows 3.1, install both NT and OS/2 2.1, and use them for their daily work. Will our testers switch back to 3.1? Here's their report.

Communications

256 8 Ways to Communicate With Windows
Saddled with a reputation as one of the most user-hostile applications, communications has finally moved up to Windows. These eight programs, armed with Windows' graphical arsenal of icons and dialog boxes, aim to shake that reputation. Do they succeed?

284 Tips for Taming E-Mail
Is your in-box bursting with messages? Here are dozens of strategies for keeping E-mail under control and making it work for, not against, you.

Cover photography by Robert Cardin, digital composition by TX Unlimited/San Francisco

Top of the News

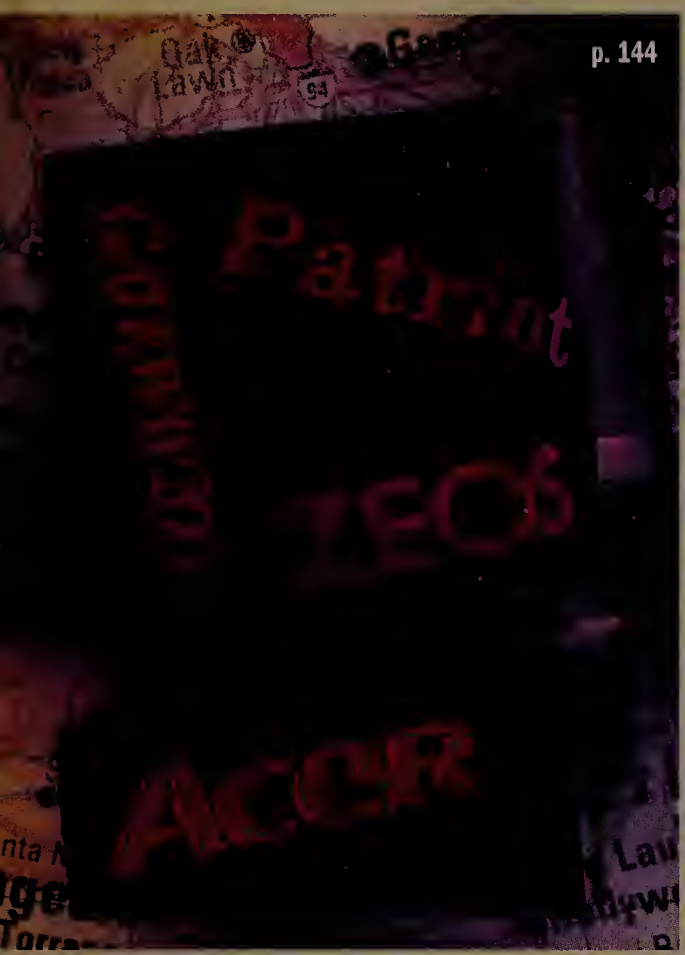
70 Word and WordPerfect Cast Powerful Spells Over Documents
New Windows versions automate everything but the writing.

74 ALR's Bargain Pentium PCs
With base prices starting at $2500, these Pentiums are hot competitors.

82 HP Offers 600-dpi Laser for Under $1000
A personal laser printer with more resolution for less money than ever before.

84 Power in Your Palm?
Apple's Newton and Tandy's Z-PDA: Small, light, but less than practical?

88 Fastest CD ROM Drives in Town
NEC's triple-speed MultiSpin drives: a taste of tomorrow's technology today.



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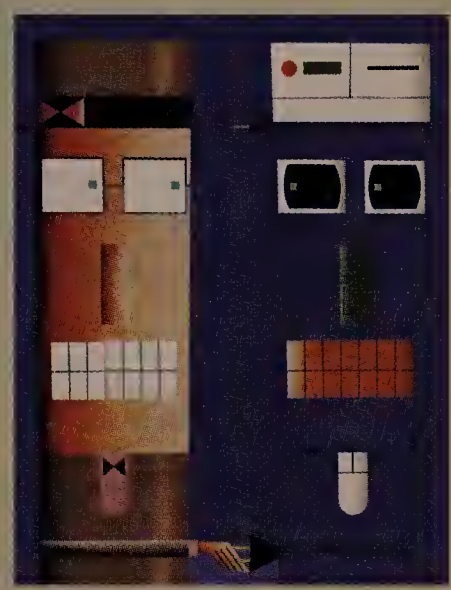
191 The Pleasures and Perils of Buying Locally
Why buy from a storefront shop when buying by mail or from superstores can be so cheap and convenient? We sent shoppers to 25 retail stores nationwide to assess staff expertise, price, and service. Here's what they found, plus streetwise advice for shopping smart.

206 Picking the Right Pieces
No matter where you buy your next PC, it pays to know which parts to ask for. Here's our guide for choosing the best motherboards, memory, upgrade sockets, hard disks, monitors, and more.

Service and Support

185 Win a 486DX2-66 PC
How satisfied are you with your PC? Have you had problems? Or is your PC trouble-free? Tell us about it! Fill out and fax in this month's survey for a chance to win a Diamond DT 486DX2-66, a Best Buy system featured in this month's review of 486 PCs.



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98 NEC V, E, and P MultiSync monitors
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102 Visio 2.0, IntelliDraw 2.0
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106 Quattro Pro 5.0 Workgroup Edition; Paradox 4.5 for Windows, Workgroup Edition
108 Altamira Composer
108 Create-A-Check, FlashForm
110 Bravo presentation graphics software
111 Prodea Synergy work-flow automation software
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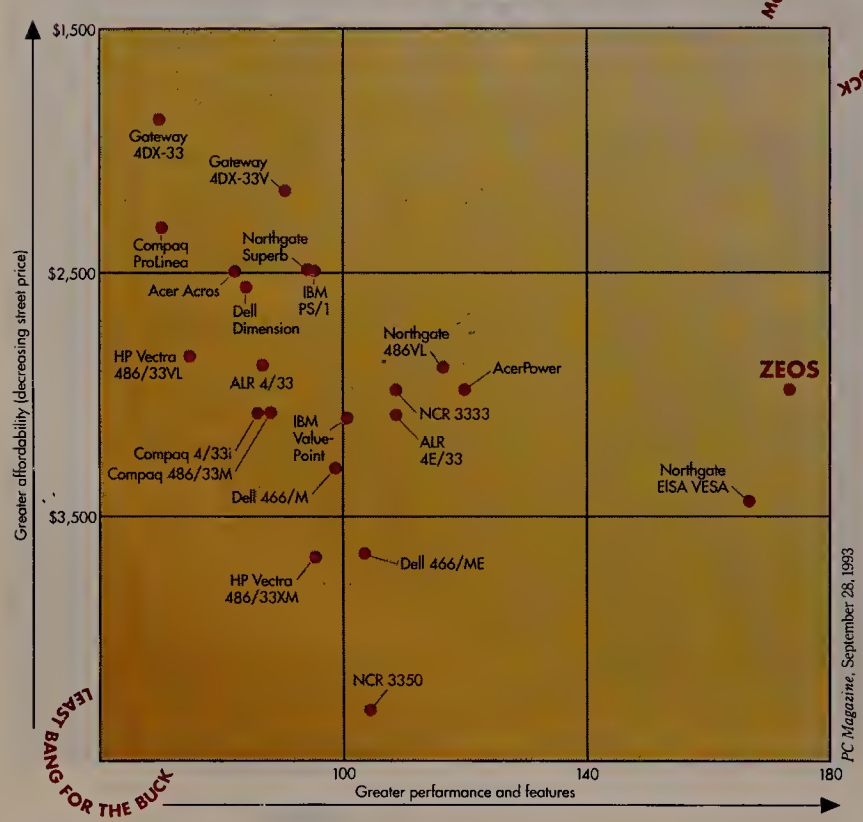
PC MAGAZINE REVEALS:

The Computer That Gives You The Most Bang For The Buck.



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Others pale in comparison. There's no way to dispute it! The results are in, and the ZEOS Upgradable 486DX2-66 is "the overall performance winner."

PC buyers expect low prices, top-quality, impeccable performance and prompt support. Basically, they want the most bang for their buck. *PC Magazine* recognized this and compared value-line PCs with more traditional systems to see if they were "truly good values or stripped-down machines trying to pass for good buys." The results are overwhelmingly in ZEOS' favor. In fact, *PC Magazine* said: *"ZEOS doesn't sell a separate value line, but the flexibility of its main system may be the least confusing solution of all."*

intel inside

Stacked against Gateway, Dell, Compaq, IBM and others, ZEOS stood alone. Using the Benchmark Tests as a guide, *PC Magazine* made these conclusions:

"As DOSmark scores are heavily weighted for processor and hard disk performance, the ZEOS garnered the first-place position in that category as well."

"The clear winner is...the ZEOS Upgradable, which turned in an incredible score of 55.01 megapixels per second."

"The real highlight among tested hard disks was the Seagate ST3600A, which has 12-ms access time and 256K of built-in cache. The ZEOS 486DX2-66 Upgradable's hard disk performance was almost 31 percent above the average in this roundup."

Of the *"systems that demonstrated the best agility under strenuous exercise of all their components... ZEOS (scored) 26 percent above average."*

The ZEOS local bus upgradable systems are the perfect solution—the brand-new motherboard is faster, more integrated, versatile and reliable than ever. Plus, ZEOS is always thinking ahead to your

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486SX-33 $1495 Lease $63/month	**486SX-33 $1795** Lease $65/month	**486SX-33 $2095** Lease $76/month	**486SX-33 $2595** Lease $94/month
486DX-33 $1695 Lease $61/month	**486DX-33 $1995** Lease $72/month	**486DX-33 $2295** Lease $83/month	**486DX-33 $2795** Lease $101/month
486DX2-50 $1795 Lease $65/month	**486DX2-50 $2095** Lease $76/month	**486DX2-50 $2395** Lease $87/month	**486DX2-50 $2895** Lease $105/month
486DX2-66 $1895 Lease $69/month	**486DX2-66 $2195** Lease $79/month	**486DX2-66 $2495** Lease $90/month	**486DX2-66 $2995** Lease $108/month
■ ZIF socket upgradability to Pentium OverDrive CPU	■ ZIF socket upgradability to Pentium OverDrive CPU	■ ZIF socket upgradability to Pentium OverDrive CPU	■ ZIF socket upgradability to Pentium OverDrive CPU
■ 2MB high-speed RAM	■ 4MB high-speed RAM	■ 8MB high-speed RAM	■ 16MB high-speed RAM
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■ Diamond SpeedStar Pro Windows-accelerated VL local bus video with 1MB RAM. 16.7 million colors.	■ Diamond SpeedStar Pro Windows-accelerated VL local bus video with 1MB RAM. 16.7 million colors.	■ Diamond SpeedStar Pro Windows-accelerated VL local bus video with 1MB RAM. 16.7 million colors.	■ Diamond SpeedStar Pro Windows-accelerated VL local bus video with 1MB RAM. 16.7 million colors.
■ ZEOS 14" 1024 x 768 N1 SVGA color monitor, .28mm dot pitch	■ ZEOS 14" 1024 x 768 N1 SVGA color monitor, .28mm dot pitch	■ ZEOS 14" 1024 x 768 N1 SVGA color monitor, .28mm dot pitch	■ ZEOS 14" 1024 x 768 N1 SVGA color monitor, .28mm dot pitch
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■ MS-DOS 6 plus Enhanced Tools	■ MS-DOS 6, Tools, Windows & new Microsoft Mouse, plus choice of Lotus Windows application	■ MS-DOS 6, Tools, Windows & new Microsoft Mouse, plus choice of Lotus Windows application	■ MS-DOS 6, Tools, Windows & new Microsoft Mouse, plus choice of Lotus Windows application

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- 120MB IDE hard drive
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- Microsoft Windows 3.1

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PACKAGE 2

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- 80MB IDE hard drive
- External 3.5" floppy disk drive
- MS-DOS 6, Windows 3.1, Lotus Organizer

PACKAGE 3

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- External 3.5" floppy disk drive
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- Extra battery
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- MS-DOS 6, Windows 3.1, Lotus Organizer

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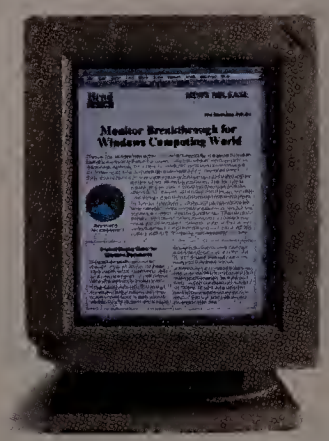

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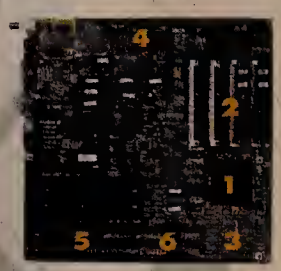

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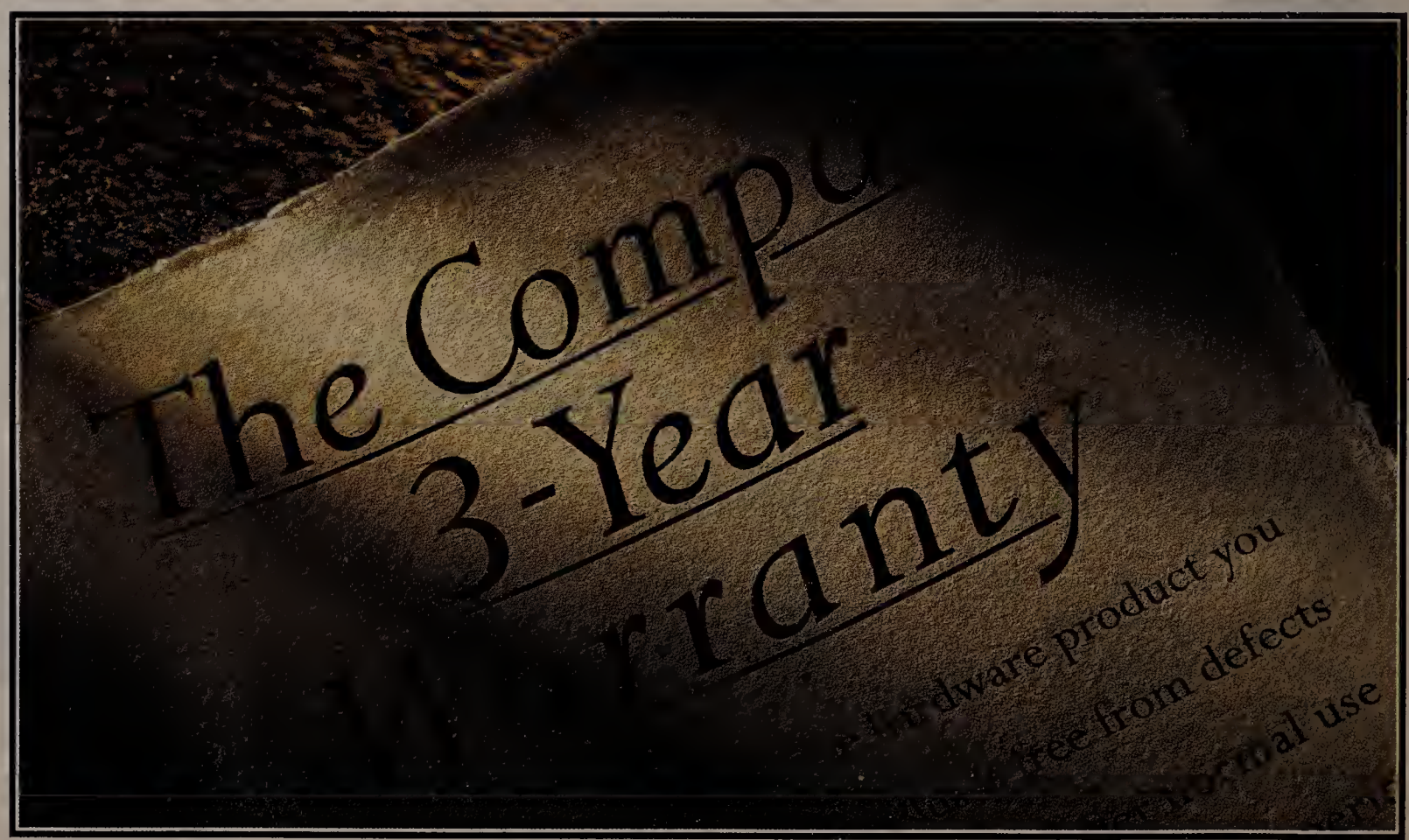

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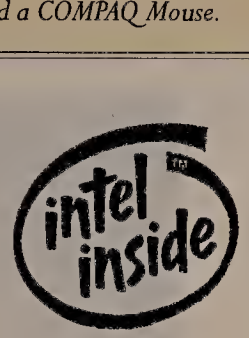

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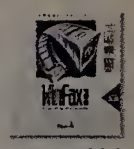

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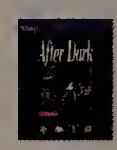

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Consuming Questions for PC Consumers

Despite all the talk about PCs becoming commodities, buying a PC is closer to rocket science than to buying a bar of soap. That's why *PC World* spends so much money and effort on consumer stories. *PC World*'s *Consumer Watch* column has resolved hundreds of individual complaints, given comprehensive advice about how to safeguard your rights when you buy, and even exposed a major mail-order fraud.

This month's special report and cover story, introduced by "Brand Name vs. No Name," explores in depth the issues in choosing between a locally assembled PC and a national brand. For "The Pleasures and Perils of Buying Locally," an article on how to choose the right local store, *PC World* dispatched experienced shoppers to 25 stores in Massachusetts, Texas, and California. In another article, "Picking the Right Pieces," we tell you how to judge the quality of PC components. The advice in these articles applies whether you're buying a locally assembled PC or a national brand from a local store.

But the heart of the special report is "486 Face-Off: Local Heroes or Little-Town Blues?" a head-to-head comparison of the best locally assembled PCs and major national brands. There are no slouches in the field—all of the PCs are high-performance machines with 486DX2-66 processors, and all feature local bus graphics. (The local bus speeds graphics by moving them along the fastest data path in the system, the processor's own.) The presence of local bus graphics in storefront PCs is but the latest example of how technical innovations in PCs race from industry leaders to every corner of the land. Even the most prestigious and innovative brand name companies have difficulty maintaining a technological edge over small-scale competitors.

But how much extra do you pay for a brand name PC? There's a reason no one has answered this often-asked question before—the research required is immense. We asked local user groups and consultants to recommend stores around the country. We found stores in Boston, Chicago, Los Angeles, Miami, and San Francisco that were willing to pit their products against national brands. Then we shipped their systems to the PC World Test Center in San Francisco and ran them through the same tests and review procedures that national brands face each month. When all was said and done, we found that even after price cutting by national brands, a savvy shopper can still save about $250 by buying a locally assembled PC. Knowing this figure enables you to weigh the comfort and convenience of buying a familiar national brand against the modest monetary savings. Regardless of which approach you prefer when buying your next PC, we hope we've saved you most of the legwork.

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Before You Buy

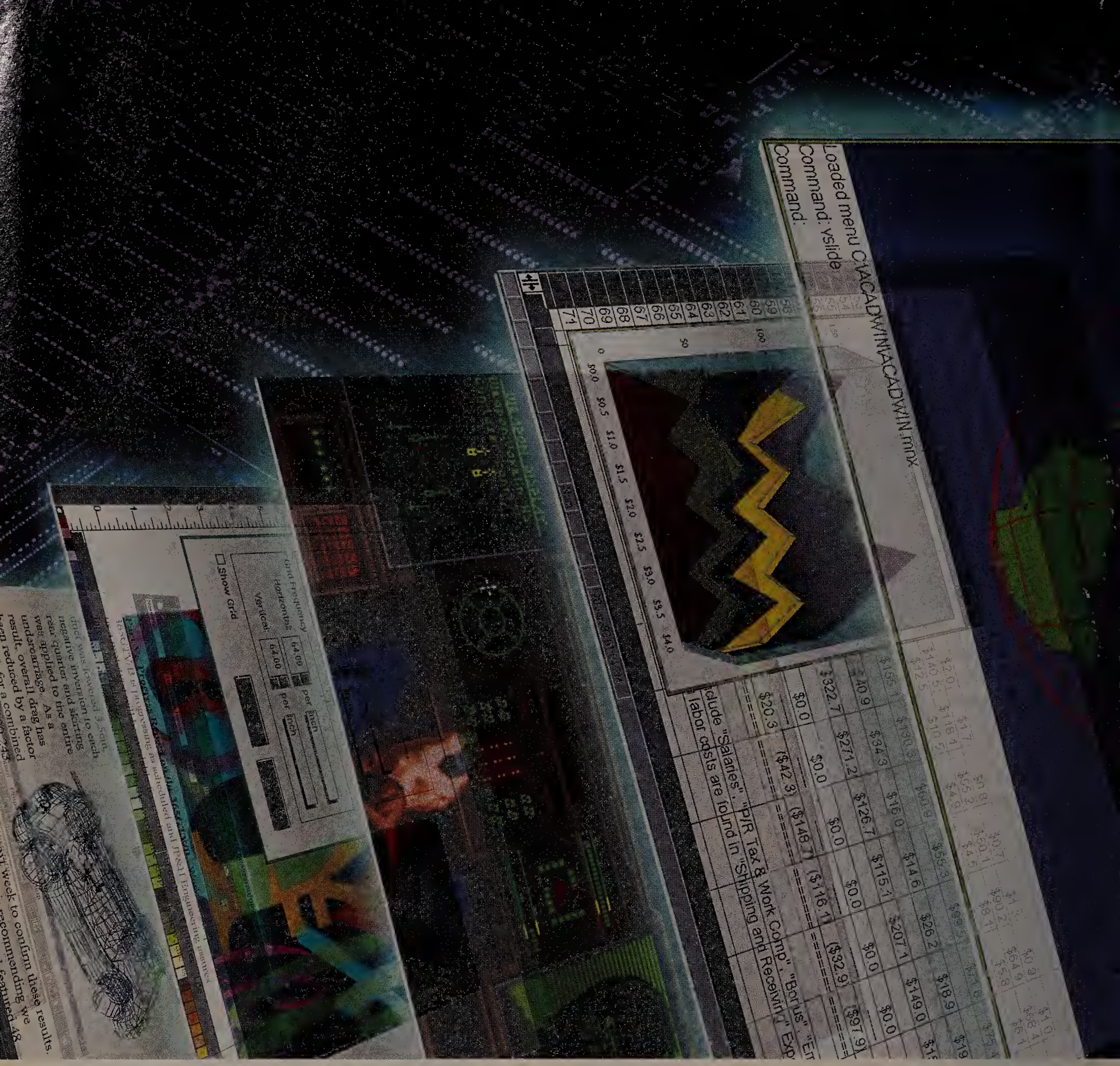
Our regular *Consumer Watch* column tries to save you trouble every month. In "How to Predict If a PC Company Will Survive," Senior Editor Roberta Furger tackles a difficult subject of vital interest to most consumers during a PC-industry shakeout. With bankruptcies and mergers commonplace, consumers should take every precaution before buying. Roberta draws on years of experience in handling consumer complaints and discusses how investing a couple of extra hours in the purchase process may save you the frustration of later trying to contact a bankruptcy court, your credit card company, the Better Business Bureau, and the police in a defunct company's hometown.

PC World
Editor in Chief
Phil Lemmons

Even when covering advanced operating systems like OS/2 2.1 and Windows NT, *PC World* concentrates on the practical side of things. That's why we asked Contributing Editors Scott Spanbauer and Brett Glass to perform their typical daily tasks using each of these operating systems in turn and then to relate their experiences with each. We were curious to see whether OS/2 or NT would win a full-time convert from Windows 3.1. After writing "Showdown on the Desktop: NT Challenges OS/2 2.1," one of the authors chose to stay with Windows 3.1. The other found the benefits of one of the newer operating systems too great to pass up. Which operating system and why? We'll leave it to the article to answer that question.

Phil Lemmons

Phil Lemmons, Editor in Chief



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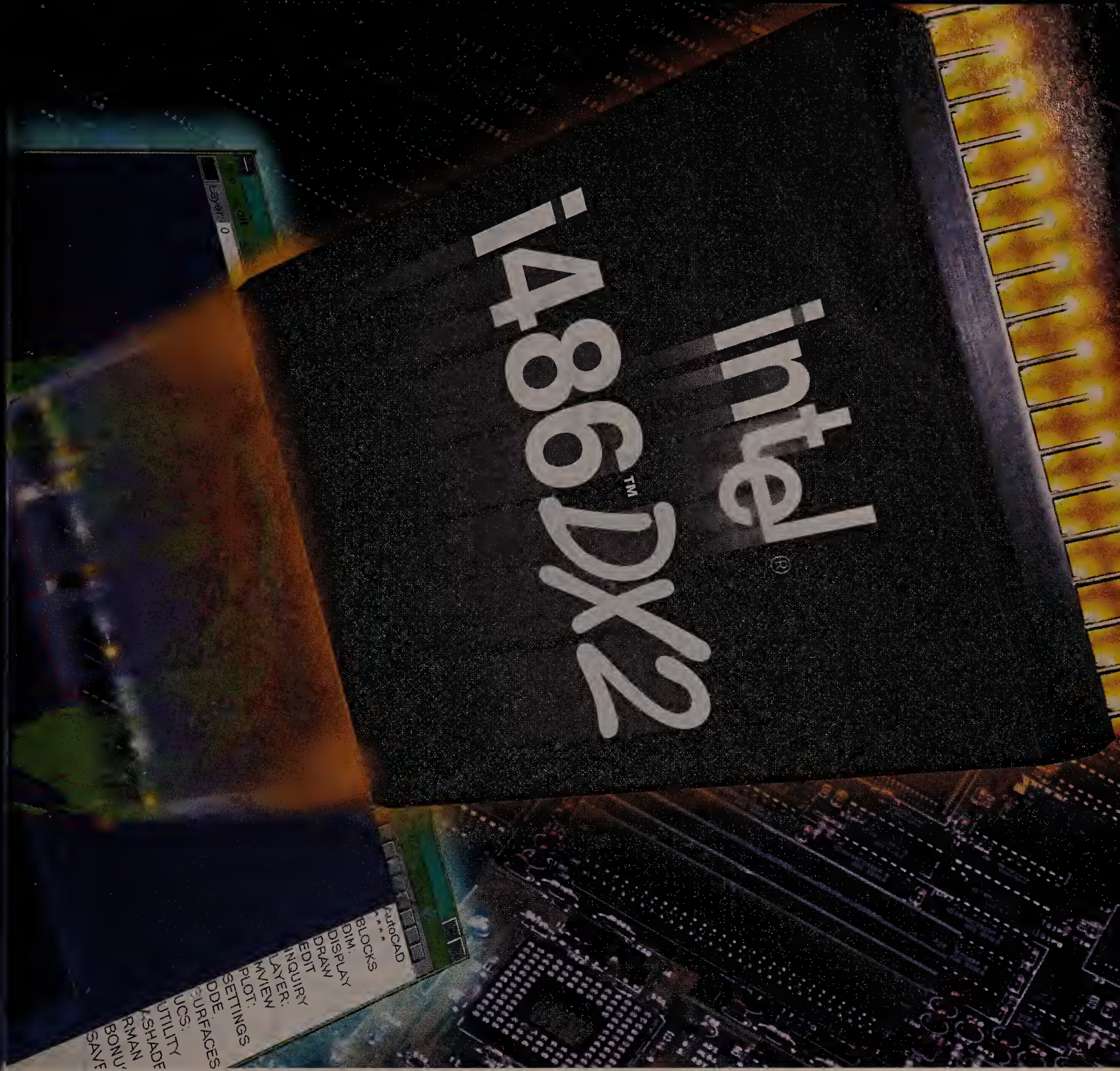

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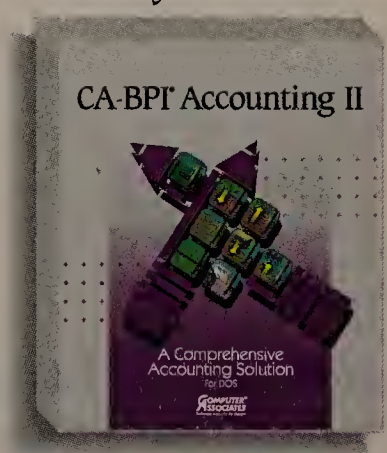

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Compelled to Compression, Another PIM, Tech Bashing

Ten Tourneys and Still No Hang-Ups

Your August article "Top Ten Utilities vs. DOS 6.0" failed to mention the primary reason your golfing readers may want to switch their disk compression from Stacker to DOS 6.0. Under Stacker, Links 386 Pro, my golf simulation package, would hang up about every six holes. Under DOS 6.0, I haven't had a hang-up or any decrease in performance after more than ten tournaments.

Al Brunsting, Chaska, Minnesota

PIM Dandy

You did *PC World* readers a disservice by not mentioning Info Select for Windows from Micro Logic in the August article, "Are PIMs Ready for Prime Time?" I've been using Info Select every day for the last two-and-a-half years—originally the DOS version and now the Windows upgrade. For me, it exceeds your description of a PIM by being more essential than my spreadsheet or word processor. I use it for dozens of daily tasks: writing memos, scheduling, status reporting, tracking projects, customizing forms, maintaining a phone database and to-do lists, and much more.

Info Select's real strength is its straightforward interface based on a stacks-of-paper metaphor. Its flexible, free-form structure allows me to organize my random information the way I want, rather than forcing me to fit my information into rigid categories. I concede that the calendar is bare bones (it uses the Windows Calendar), but calendar-centered Lotus Organizer doesn't even offer a monthly view.

To me, functionality is more important than mouse-clicking my way through the pages of a simulated day planner.

Laurence Little, Ridgewood, New Jersey

Editor's response: Info Select wasn't included in the PIMs review for two reasons: First, the Windows version wasn't available in time for evaluation. Second, it isn't directly comparable to the other programs in the review. The chief difference: Info Select doesn't have dedicated calendaring or scheduling tools. Info Select is a text database, which means it can take raw textual data and search and sort it for you. This isn't to say it can't be used as a calendar/scheduler, but we were looking for programs whose calendars (and other PIM tools) are ready to use right out of the box.

No Tech Bashing, Says Zealous User

In the August article "Instant Office: Best Buys From $1900," Rex Farrance and Melissa R. Riofrio reviewed the Amax 486DX2/50 VESAmax in one word: "Wow!" And wow is right. I have owned the machine for only a few months, and that word sums it up.

But I was shocked by the bashing the technical support department received in the review. In the short time I've owned the machine, I've needed support on at least three occasions and reached the company via a toll-free line. The first two times, my calls were returned within an hour; the last time I waited only 10 minutes. The technician spent almost an hour on the phone with me, correcting problems I had accidentally caused in my overzealous use of the machine.

In my experience, Amax's sales and technical people deserve the same high rating as their 486DX2/50.

Rege Thomas, Mountainside, New Jersey

First Online

The tenor of Van Wolverton's response in August's *Letters* to those who criticized his May article ["DOS 6: Do You Need It?"] is tantamount to a 6-year-old with his thumbs stuck in his ears, wiggling his fingers, and saying "NEENer NEENer NEEEENer!"

I upgraded to DOS 6.0 and began experiencing problems, but I wasn't computer-sophisticated enough even to *think* that the new operating system could be the culprit. Neither Microsoft's diagnostic tools (MSD) nor Norton 7.0 detected any problems. And none of the articles I read said there were problems with DOS 6.0.

It's reassuring to know that I wasn't imagining gremlins. From now on, when I experience weird problems with my computer, the first thing I'll do is log on to online services to see if others are having similar problems.

Steve Cohen, via PC World Online

Scary Flurries

The flurry of letters about DOS 6.0 in the August issue is scary. I haven't had any of the problems noted by your readers, which makes me wonder if I did something wrong.

The upgrade process was virtually seamless. No files corrupted, nothing lost, my disk space easily doubled with DoubleSpace, and my expanded memory kicked in without a hitch. Also, I love the new utilities bundled with the program. I don't find the utilities any better than the separate ones I had pre-

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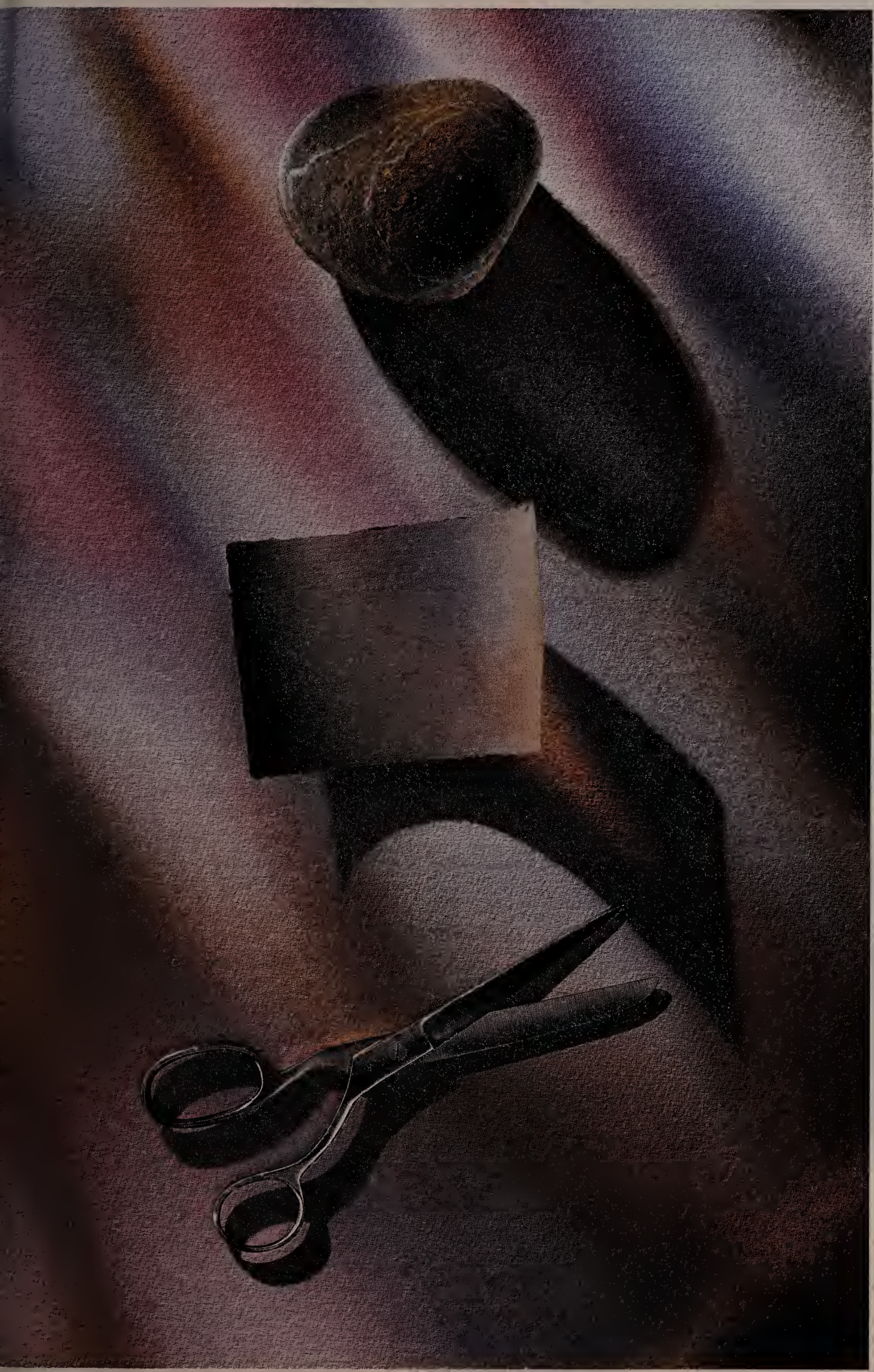

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viously, but I like the convenience of having them all tied to one program.
William E. Perry Jr., El Granada, California

The Bugs of Corel 4.0

I read "CorelDraw 4.0: One-Stop Graphics Shop" in July with a great deal of interest and even greater surprise [*Top of the News*]. I have used CorelDraw 3.0 commercially for some time and eagerly upgraded to 4.0 on its release.

Your review, like most I've seen on this product, is highly praiseworthy, although to your credit, you did point out that some of the package isn't as complete as the Draw element. But what about the bugs?

This program is costing me money in time and lost jobs. General Protection Faults abound, results aren't what you expect, it's incredibly slow on my 386-33 machine, and it simply shouldn't be on the shelves yet. If your reviewer had taken even a cursory glance at the Corel forum on CompuServe, it would have been obvious that there are legions of users who want their money back or have simply reverted to version 3.0 until Corel gets around to fixing this nightmare.

When reviews highlight all the good points (and there are several) but ignore the numerous bugs and slowness of the software, they do a disservice to readers.
John Pilger, Long Beach, California

Editor's response: The article Pilger refers to was a test drive of beta software. Since the program wasn't shipping when the preview was written, users were not yet expressing their dissatisfaction in forums. A preview points out the features of the software and compares the current version's functionality, ease of use, and learning curve with previous versions and with the competition. Although prerelease software is often buggy and slow, problems are generally corrected before the product ships. We can't, therefore, make informed judgments on these types of problems before we see the shrink-wrap copy.

Corel has issued a maintenance release that reportedly fixes the problems with OLE, problems importing JPEG and exporting EPS files, difficulty printing color separations, and sluggish clipboard transfers. Since OLE is still an evolving technology, frequent updates will be posted in the Corel forum on CompuServe. Registered users of CorelDraw can get the update by calling 800/772-6735 or 613/728-3733.

Previously Owned

After reading your interesting and informative article "Laser Printers From $700" in July, I decided to buy an Epson ActionLaser. But then I saw an NEC ad for refurbished Silentwriter Model 95 printers. I called NEC and found out that I could get a refurbished PostScript Level 2 printer for only $699! The sales rep was pleasant, advised me on the definition of refurbished, and even called some merchants to find the lowest price on a new printer.

I purchased the NEC. It arrived in three days in new packaging, with new disks and manuals, and it was in immaculate condition. The company also provides a 90-day warranty and 30-day return policy, no questions asked.

Although refurbished units were probably

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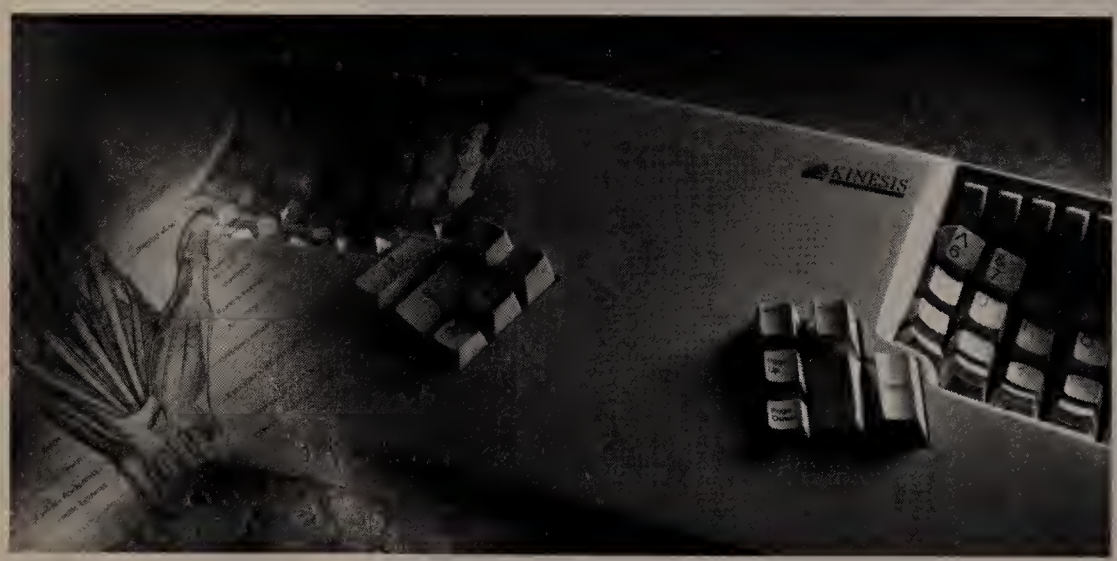

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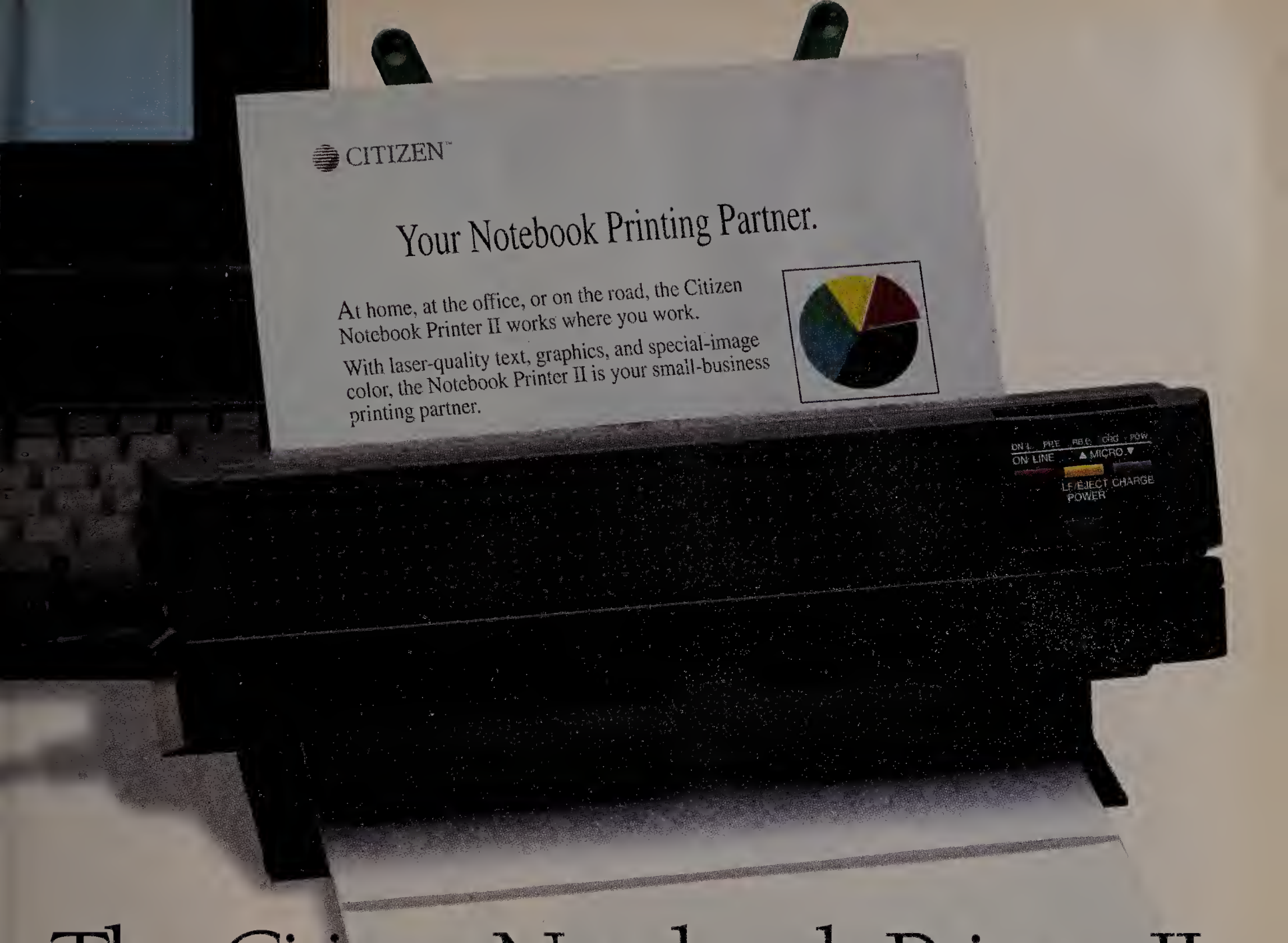

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out of the scope of your laser printer report, the option of buying refurbished models—especially from a reputable corporation like NEC—should have been mentioned.
Nicholas Nguyen, via PC World Online

Just Go Shopping

Consumer Watch regularly includes letters from people who say they've been short-changed by mail-order firms. They can avoid this situation by shopping locally. If you support your local business, you inject money into your local economy, you get a feel for the stability of the company, and you can carry the computer in for service instead of shipping it long distances.

Local computer stores don't always stay in business, and not all mail-order houses are scam artists. However, mail-order enthusiasts need to consider shipping costs, taxes, and long-distance phone charges when tallying costs. How many people would order a new car from an unknown company several hundred miles away?
Michael Galvin, Ottawa, Ontario, Canada

Editor's response: Galvin raises some valuable points. For some tips on choosing a local store and shopping locally, see "The Pleasures and Perils of Buying Locally" in this issue's special report.

Tip-Top Tip

The Excel 4.0 item on page 228 in June's *Spreadsheets* ["Constant Subtraction Is Getting Me Down]" was worth the price of the subscription. I maintain a worksheet of prices and product descriptions that's currently about 2800 rows. It seems the boss always wants to change the price of entire product lines. What a chore that used to be. Thanks for the timesaving tip.
Jerry Hem, via PC World Online

Muzzle That Modem

I tried your Power Tip no. 277 [May, page 26] and added an L0 to my modem string that's used to dial up AOL. No luck. It's still shrieking away on connect. Is it me?
B.F., via PC World Online

Author's response: No, it's just a peculiarity of America Online's software. You must place the L0 command in just the right spot. Load the AOL software, click *Setup*, then *Setup Modem*, and finally *Edit Commands*. Locate the Dial Prefix line in the dialog box. You'll see a string of commands to the right like this: ATV1 S11=55 Q0 E0 D. Add the **L0** command between the E0 and D. That should silence your modem once and for all. —*Robert Luhn*

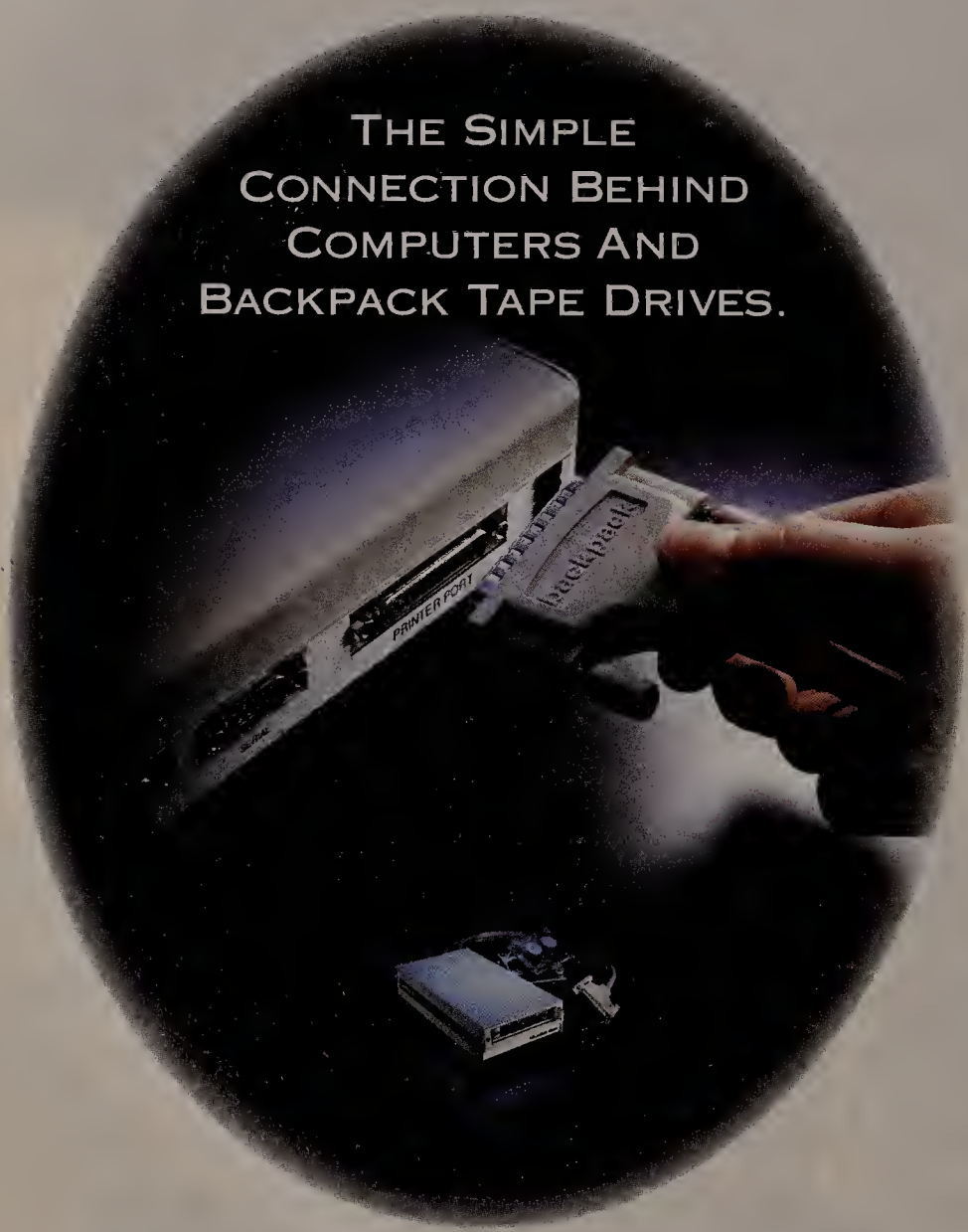
Corrections and Clarifications

The September buyer's guide on input devices ("Finding the Perfect Touch," page 213) listed the price of the Kinesis Ergonomic Keyboard as $690. The correct price for release 2, now shipping, is $390. Kinesis Corporation can be reached at 800/454-6374.

Due to a misunderstanding, we misstated Duracom's service and support policy in "486 PCs With the Works" (September). The company offers a full on-site service program from one to three years.

PC World regrets the errors.

PC World *welcomes your responses and ideas. See page 10 for contact information.*



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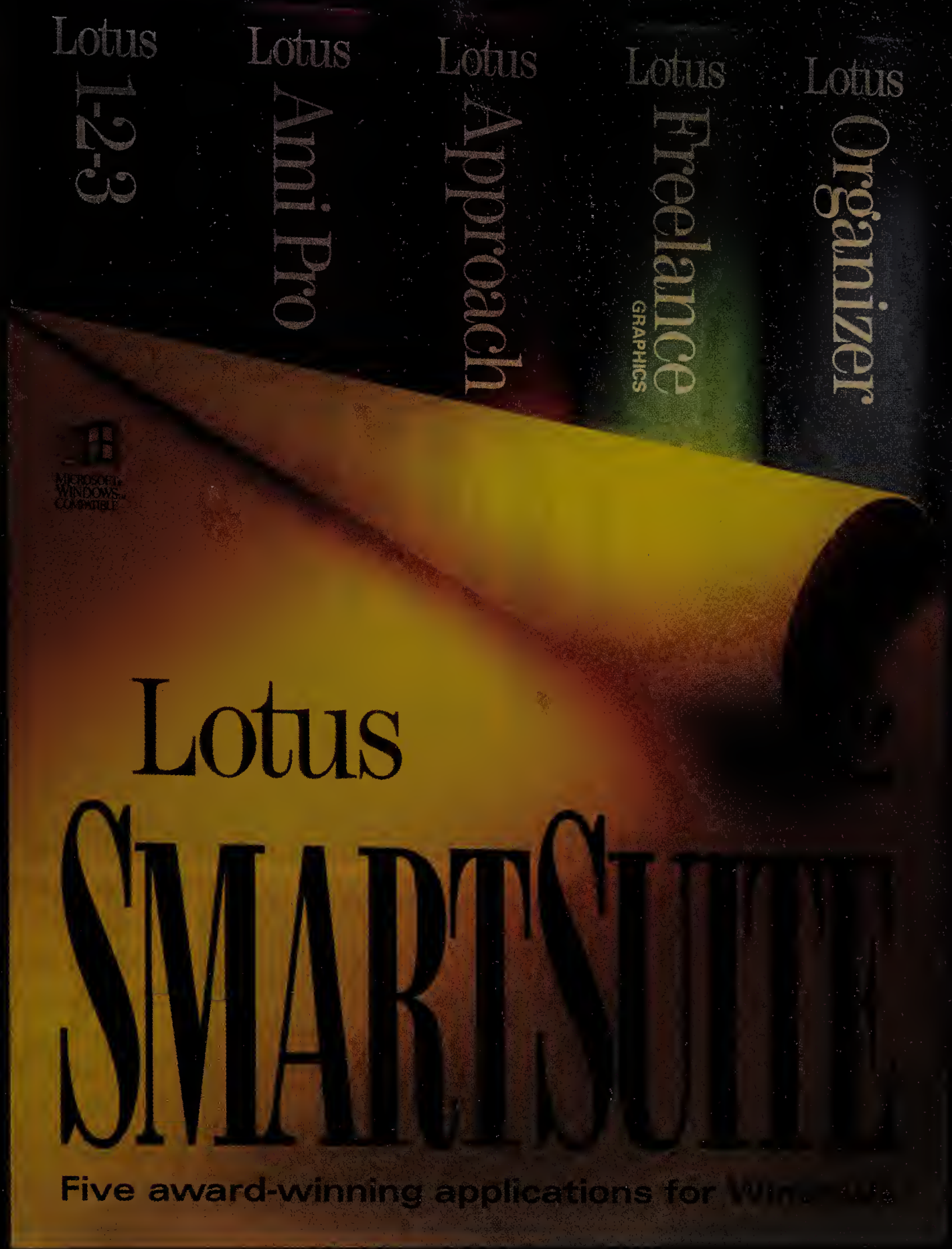

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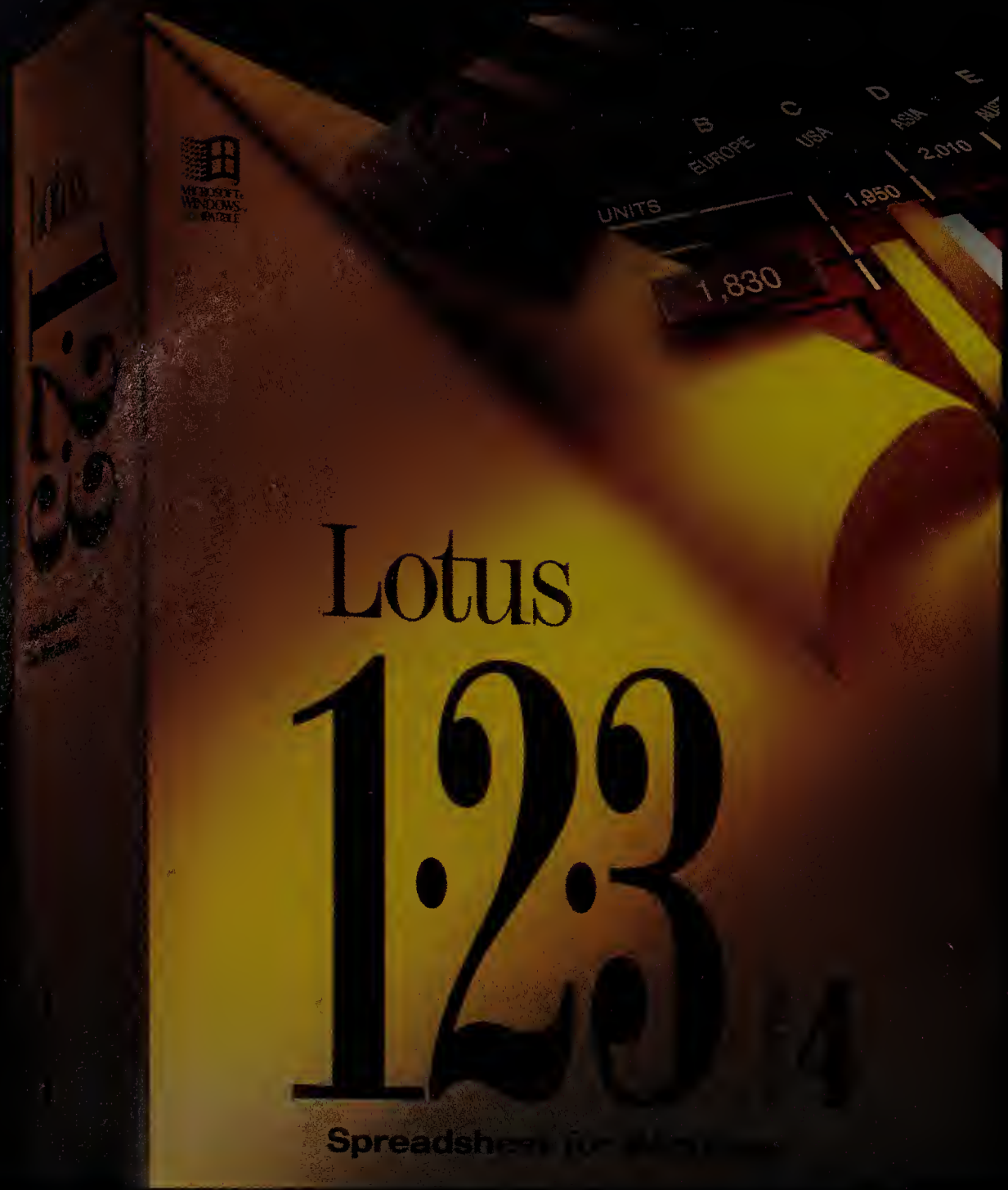

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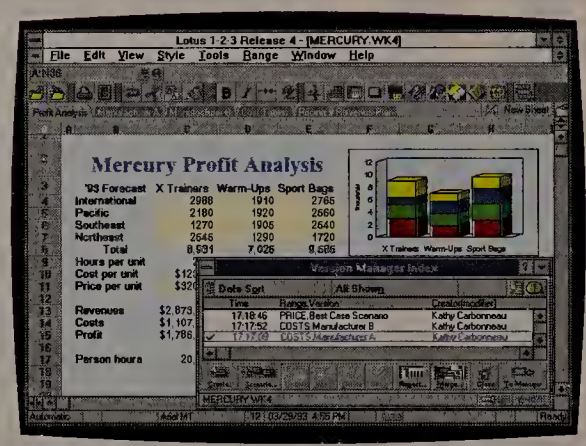

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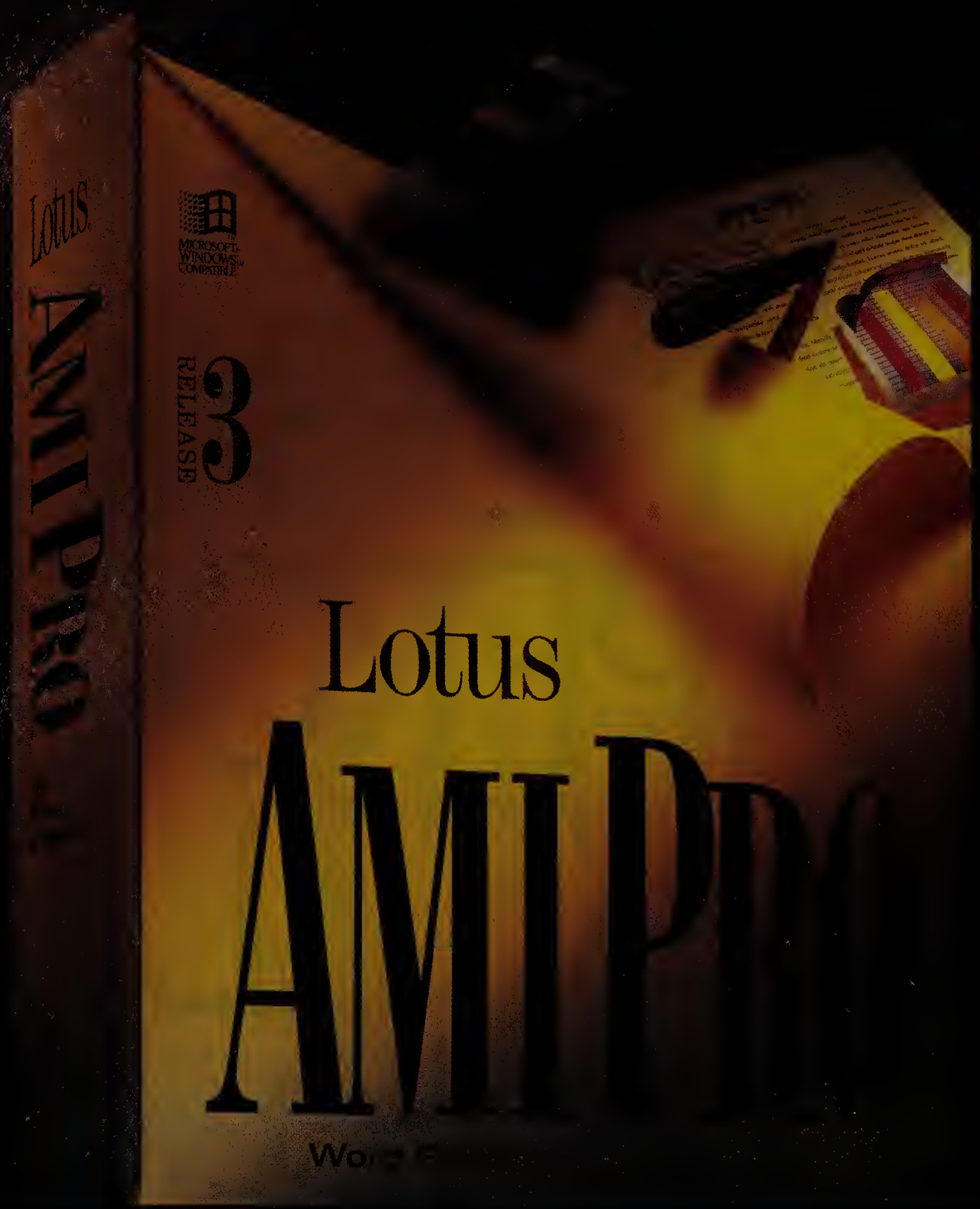

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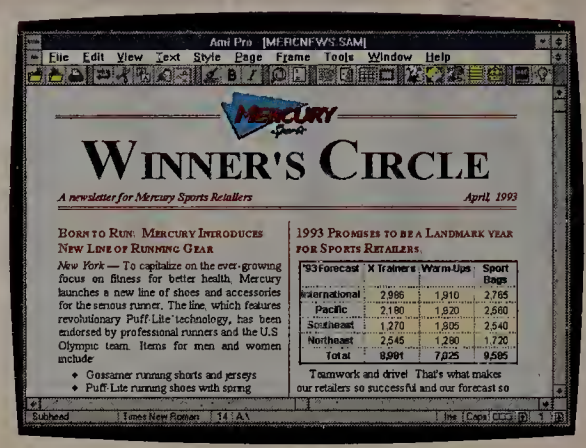

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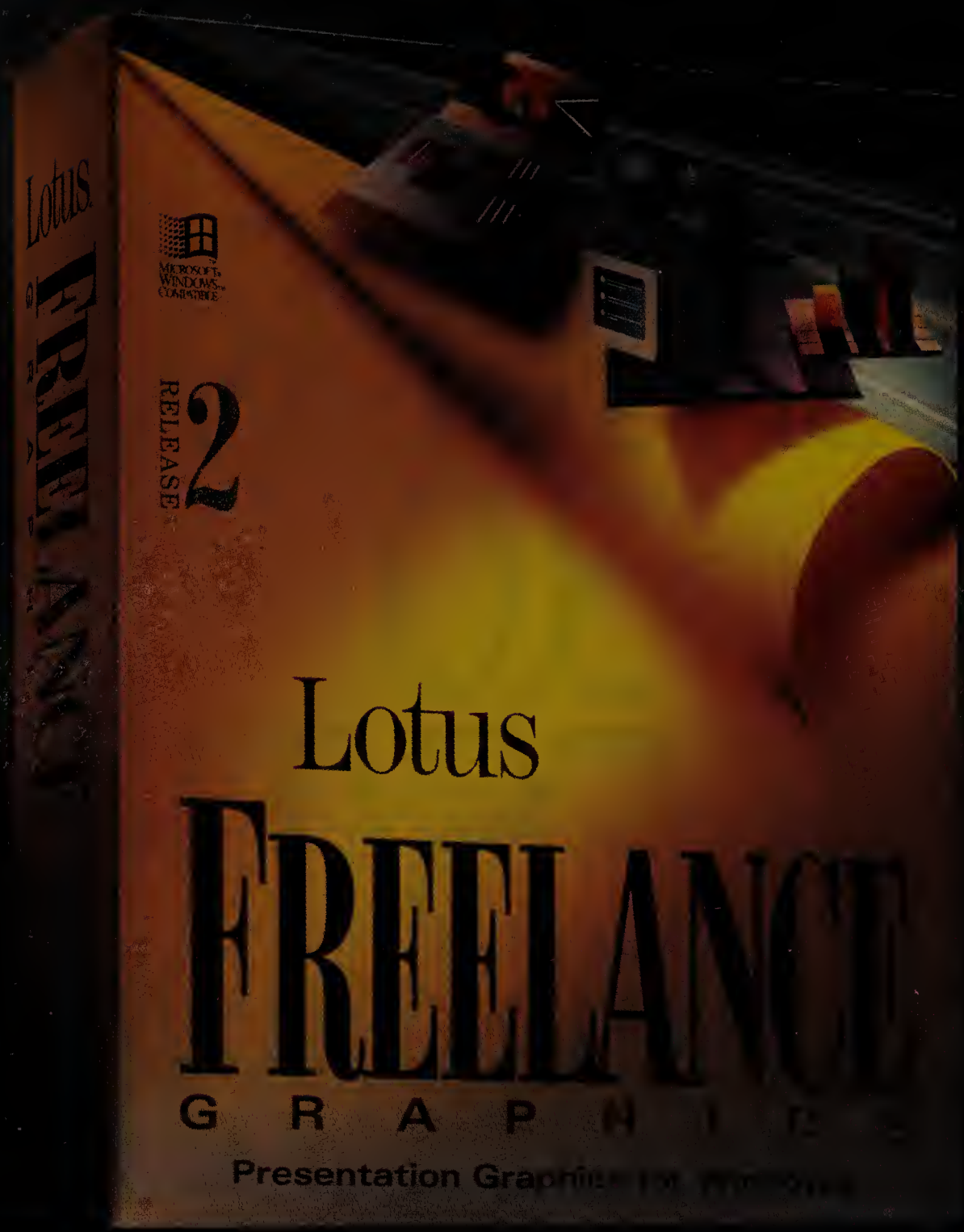

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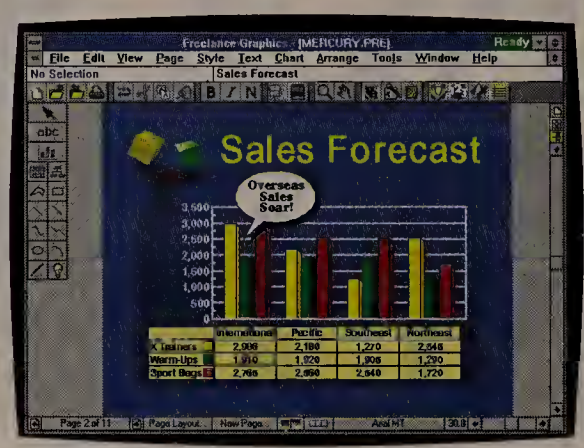

Graphics, like more than 65 SmartMaster™ design sets, 500 symbols and 100 chart styles. And when you're done, you can turn four-color overheads into black and white hand-outs with just one click.

The integration of Freelance Graphics with other Lotus applications is so complete that if you bring your 1-2-3® data into a Freelance presentation, and you later change a number in your 1-2-3 spreadsheet, it will be instantly reflected on the Freelance chart.

For your own live presentation, visit your Lotus Authorized Reseller. Or call **1-800-TRADEUP, ext. 9091*** for a free, full featured working model. By the way, have you ever used a database?

Lotus
Working Together®

*In Canada, call **1-800-GO-LOTUS**. ©1993 Lotus Development Corporation, 55 Cambridge Parkway, Cambridge, MA 02142. All rights reserved. Lotus, 1-2-3 and Freelance Graphics

"Creating a presentation of even (100 slides) is absurdly easy--and much easier in many ways than with competing products..."
PC Week 2/15/93

"Freelance is as close to presentation perfection as you'll find on any shelf."
Windows User 8/93

"FREELANCE SCORED AN AWESOME 98.9 OUT OF A POSSIBLE 100...

POWERPOINT 3.0 SCORED 83.6, HARVARD GRAPHICS 2.0 SCORED 80.4" – *PC/Computing* 9/93

"Lotus Freelance Graphics
★★★★★
Microsoft PowerPoint
★★★"
Software Digest 7/93†

"(Freelance Graphics) outclasses the competition in features and ease of use."
InfoWorld 6/21/93

"The users in this study were more productive, more effective, and more satisfied with Freelance Graphics than PowerPoint...PowerPoint users took 64% more time to complete their presentations."
Usability Sciences Corp. 3/93

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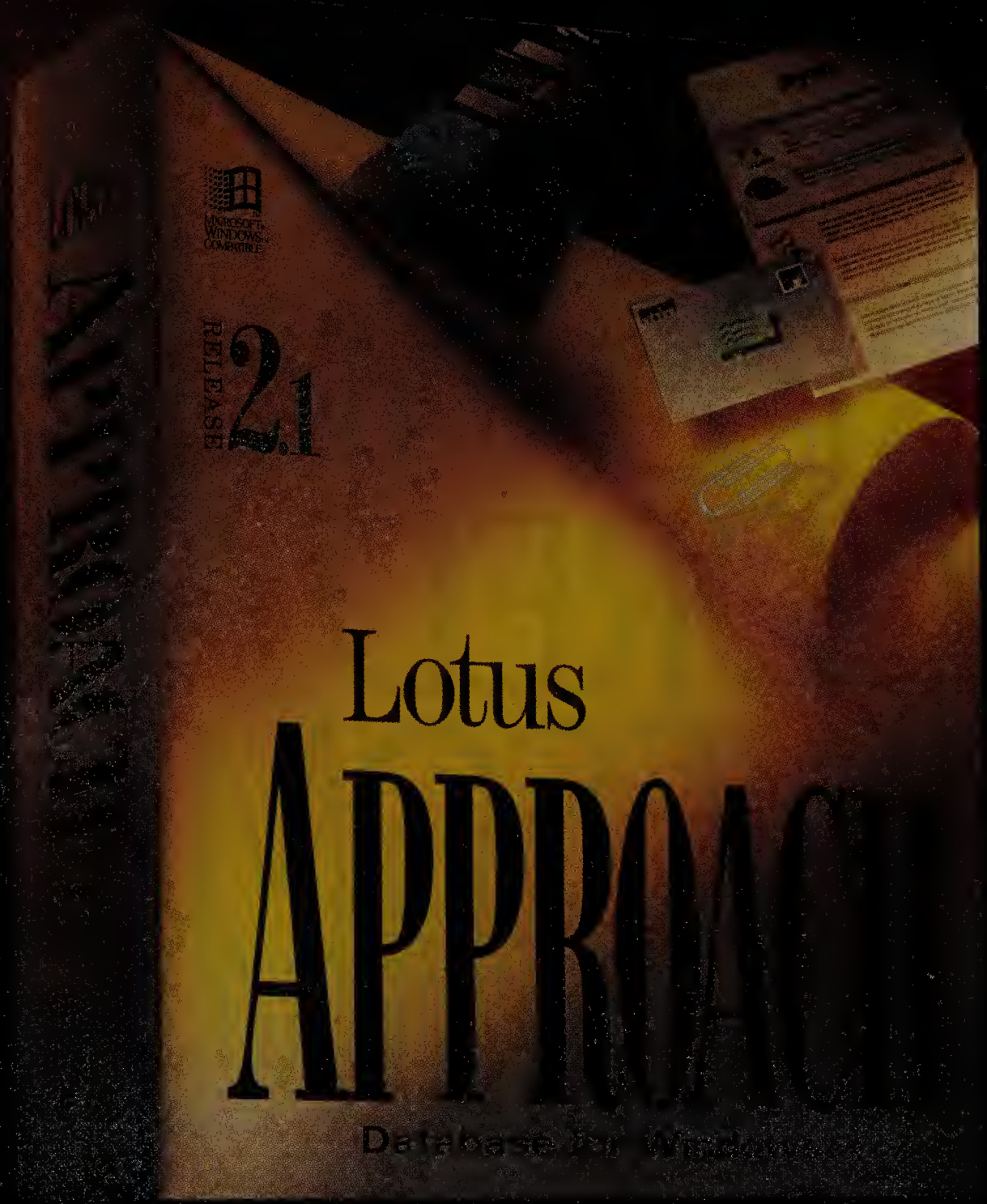
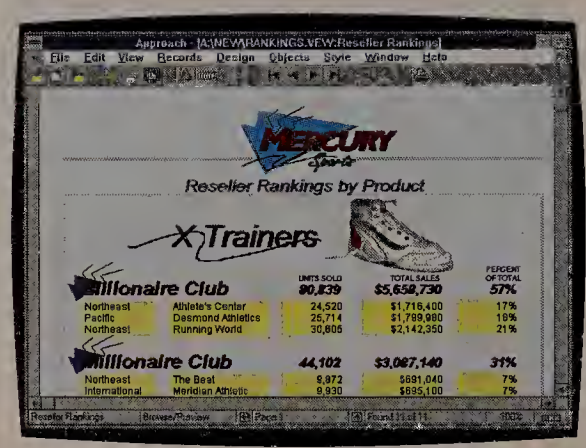


Award-winning Lotus® Approach™ defines a whole new database category: the full powered client/server relational database for the general business PC user. No longer do you have to be a programmer, or think like one, to experience the everyday advantages of a relational database.

Now you, yes you, can build and use your own databases as easily as you build and use your own spreadsheets. For sales reporting, invoicing, project management, customer tracking, mailmerge or hundreds of other uses. Now PC users can enjoy easy, one-click, high-performance access to company data stored in all the major formats (including dBASE,® Paradox,® FoxPro,® Oracle® SQL, SQL Server and DB2®†) across all popular networks.



If you've never worked with a Windows™ database, or if you bought Paradox or Access only to find they were unworkable, Approac will change everything. An independent stud found that Approach users are up-to-speed and producing real results in two hours.**

And because Approach is designed to share with other Lotus Windows application using Approach databases to mailmerge with Ami Pro,® to share data with 1-2-3® spreadsheets, or to simply report on data is something anyone can do.

What a difference a database makes. Visit your Lotus Authorized Reseller or call **1-800-TRADEUP, ext. 9091**.* Or get the whole suite and save a few hundred bucks.

Lotus
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*In Canada, call **1-800-GO-LOTUS**. **Market Probe International, May 1993. †Requires MicroDecisionware Gateway. ††Reprinted from Windows Magazine with permission. ©1992 by CMP Publications, Inc. 800 Community Drive
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"...Approach offers much easier-to-use database-creation tools for individual users, and easier access to big-time databases than either Microsoft Access or Paradox/Windows...Approach is a big, big winner."
PC Week 6/28/93

"APPROACH... IS BOTH PRODUCTIVE AND HIGHLY USABLE. ACCESS WILL BE TOO OVERWHELMING FOR END-USERS..."

"...Approach 2.0 is one of the few (software) packages...for which it's truly possible to never open the manuals."††
Windows Magazine 12/92

—*InfoWorld* 1/17/93

"Best Buy Approach is the simplest and most straightforward relational database."
PC World 6/93

"The most usable Windows relational database ever."
PC/Computing 8/93

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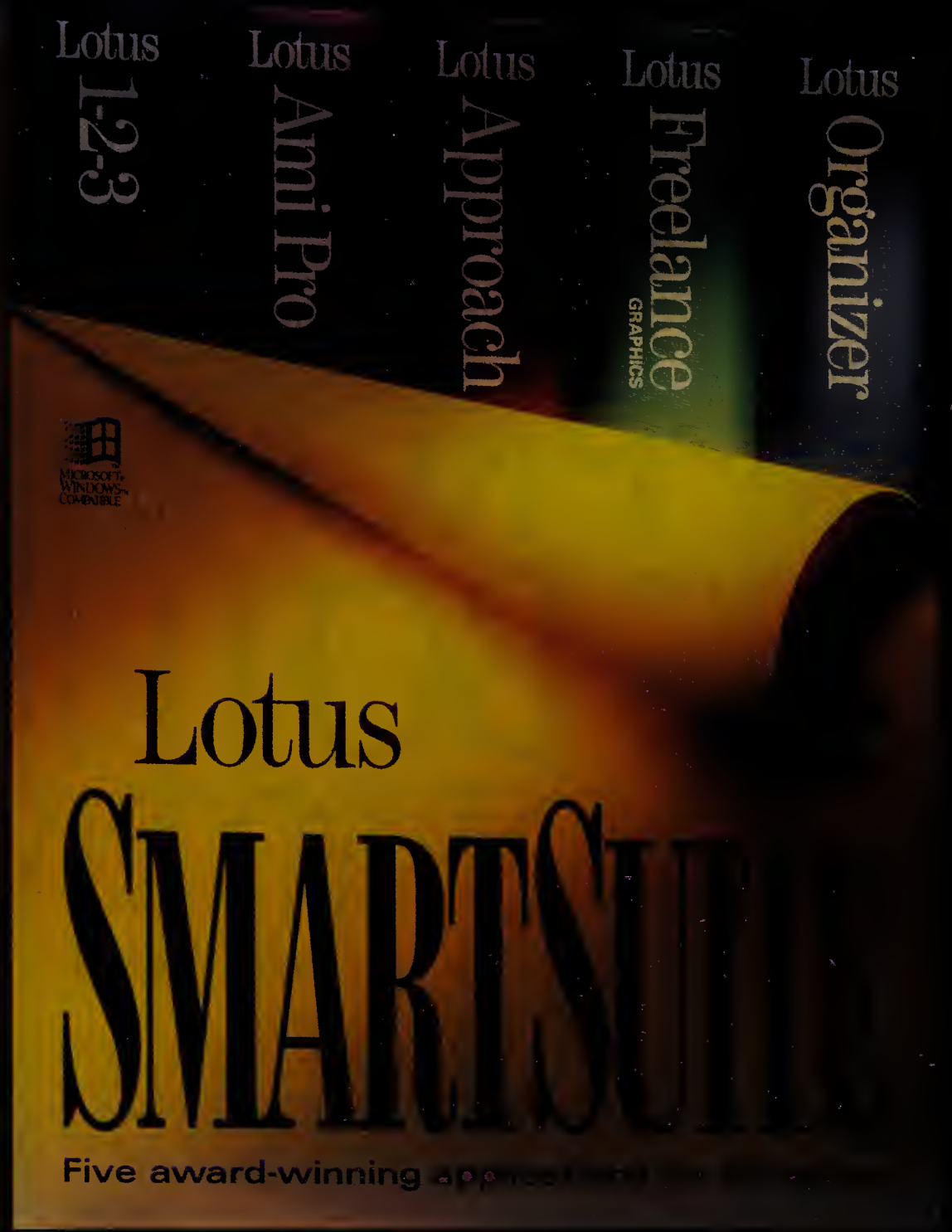
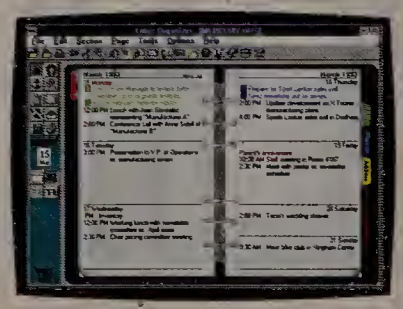


The new Lotus® SmartSuite™ 2.1 is the most complete desktop solution for Windows™ users. It brings together 1-2-3® Release 4, Ami Pro® Release 3.01, Freelance Graphics® Release 2.01, Approach™ 2.1 and Organizer™ 1.1 at an irresistible price (upgrade for just $299***). But it's much more than a deal on an all-star collection of Windows applications.

The applications in SmartSuite 2.1 are closely integrated, sharing a consistent appearance and behavior. This reduces the time it takes for a user to learn each application. For example, the three most used applications in SmartSuite share 26 common SmartIcons® (In Microsoft® Office, they share 3).

Far beyond anything possible with Microsoft Office, Lotus's integration also simplifies the process of switching between applications, sharing information across applications and using functions from one application while working within another.

For example, you can easily edit 1-2-3 charts from within Freelance Graphics. Or use Freelance, or 1-2-3 functions within Ami Pro. All work easily with the Approach database. And all support industry standards, so they'll work with offerings from other vendors as well. This makes working in each application, and the entire Windows platform, easier and more productive than ever before.


Lotus SmartSuite also includes a personal information manager, the award-winning Lotus Organizer.

SmartSuite is also designed for working in groups in ways Microsoft Office can't. All applications are network ready and mail enabled with ccMail.™ The results of Working Together® are easily manageable through 1-2-3's Version Manager. And each application features additional enhancements for full integration with Lotus Notes.®**

Unlike Office users, SmartSuite users can call a single toll-free number for support.

For the whole story, visit your Lotus Authorized Reseller. Until 12/31/93, you can upgrade from any Lotus or competitive product to SmartSuite 2.1 for just $299.*** Or for a SmartSuite demo disk, call **1-800-TRADEUP, ext. 9091.***

"LOTUS SMARTSUITE REDEFINES HOW APPLICATIONS SHOULD WORK TOGETHER."

"Lotus now has a top rated product in each of a half a dozen categories... Moreover, Lotus products have come to share a great deal of genuine integration..."
*Soft*Letter* 5/21/93

"When you buy...SmartSuite, the pieces really work together!...The point: There's more to a suite than cramming four boxes into a suitcase and cutting the price."
PC/Computing 8/93

—*PC Letter* 6/7/93

"The level of integration in the SmartSuite makes complicated, cross-application tasks easier for users and lets them take full advantage of...the Windows environment."
Dataquest 6/15/93

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In Canada, call **1-800-GO-LOTUS**. **Consult your Lotus Representative for more information on how to incorporate Lotus Notes and ccMail into your communication strategy. ***$299 direct from Lotus. Offer expires 12/31/93. Qualifying competitive products are: Microsoft Excel, Borland Quattro® Pro (not including SE), Microsoft Word, WordPerfect, Wordstar,® DisplayWrite,® Microsoft PowerPoint, Harvard Graphics, Corel Draw, WordPerfect Presentation, Aldus® Persuasion. Qualifying Lotus products include 1-2-3 (excluding 1-2-3 for Home), Symphony, Ami Pro, Freelance Graphics, ccMail and Graphwriter®. Lotus Notes and Graphwriter are registered trademarks and SmartSuite and Lotus Organizer are trademarks of Lotus Development Corporation. ccMail is a trademark of ccMail, Inc., a wholly owned subsidiary of Lotus Development Corporation. Quattro is a registered trademark of Borland International, Inc. Wordstar is a registered trademark of Wordstar International, Inc. Displaywrite is a registered trademark of International Business Machines Corp. Aldus is a registered trademark of Aldus Corporation.

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Circle 132 on reader service card

How to Predict If a PC Company Will Survive

How do *you* choose which PC to buy? If you're like most computer buyers, price and performance top your list of priorities. Those aren't bad criteria, really. But given the current turmoil in the PC market, it's time to add another item to the list: the manufacturer's financial stability.

Company closures, bankruptcies, and reorganizations among PC makers are commonplace. Beset by ever-lower prices and the dizzying pace of technological advances, even the largest and strongest of PC companies are showing battle scars. Once-successful firms like Everex, Tandon, Standard, and CompuAdd have gone out of business or are struggling under bankruptcy—and their current customers are struggling right along with them.

With the upheaval has come a slow but growing awareness among buyers of the need to evaluate a company's long-term viability. *Consumer Watch* receives calls daily, in fact, from buyers looking for advice on how to do just that. Their concerns include a company's track record and how to make sure the firm will be around when the time comes to service its computers, assist in upgrades, and provide technical support.

Unfortunately, there's no foolproof way to investigate the survivability of a PC company. One option is to buy only from large, publicly held firms whose financial successes and failures are visible to anyone who cares to look. But consider the limitations of this approach: Unless you follow a business closely, you may not hear of the inevitable fluctuations in its position and may be misled into thinking it's financially secure. A public-company–only buying rule also limits your options, since it effectively rules out all young firms, even though they may offer state-of-the-art technology at aggressive prices.

So without limiting your options to the big guys, how can you be confident that the firm you buy from will be solvent tomorrow? In a word: legwork. The research will add a couple hours to your selection process—time that some buyers won't or can't spend. But as anyone who's been stranded without a warranty or support (or, worse, without the PC he or she ordered) can tell you, it can be time well spent.

By Roberta Furger

Start Dialing

Start your investigation by making a call to the company that you're considering. Besides asking the salesperson all of the pertinent product questions, get the lowdown on the company as well. Ask how long the firm has been in business, how many employees it has, and what the company's estimated sales are per month. Sure, you'll hear the party line, but it's a start. If the salesperson doesn't know the answers or declines to answer, ask to speak with a manager.

With the company-supplied information in hand, you're ready to call some independent sources. At the top of your list should be the Better Business Bureau and chamber of commerce for the city in which the company is located and the Direct Marketing Association (212/768-7277). When you call the local business organizations, find out if the company is a member in good standing, if they've received complaints about the firm, and, if so, if the problems were resolved satisfactorily.

Remember that not every business joins the chamber of commerce or the Better Business Bureau. In particular, companies with a national sales focus (such as mail-order firms) may be less likely to join a local group. Still, customers will often report problems to one of these organizations, even if the company in question is not a member. The DMA, a national association of mail-order companies, offers a Mail-Order Action Line that customers use to report problems they're having with member companies. As with the local groups, ask the DMA if your prospective vendor is a member and find out whether the company has been the subject of complaints.

PC World Consumer Watch editor Roberta Furger

When you've tired of talking, log on to a forum on at least one online service (CompuServe, GEnie, and so on) and ask other users about their experiences with the vendor in question. Online users are generally eager to warn fellow buyers away from problem companies and recommend vendors that offer quality products and services. If you don't have a modem, you can try calling your local user group (see last month's *Consumer Watch* for names and phone

numbers). Reaching someone at a local user group isn't always easy, though, since it's probably staffed by volunteers.

While you're waiting for responses to your online queries or calls to user groups, check out back issues of computer magazines to see how long a firm has been advertising. Companies often advertise in a variety of publications, so you may need to go through a few different magazines to get an accurate picture. While you're skimming those back issues, check out the annual awards articles. The best smaller companies will often be mentioned as "best in class."

Investigations 101

Maybe you think you shouldn't have to be a junior detective to buy a computer. And maybe you think the potential risk isn't worth the effort. But I would argue that if you're going to spend a couple thousand on a computer, then it's worth taking a few hours to investigate the manufacturer.

After all, if the company goes out of business, you'll be on the phone at least as long calling the bankruptcy court, your credit card company, the Better Business Bureau, local police....You get the idea.

Has your PC maker gone out of business? What steps do you take to investigate new companies? Call 415/974-7366 ext. 245 and tell us your secrets. We'll report on the most interesting comments in an upcoming issue.

Shop Talk

The Overextended Warranty

I paid for my new Gateway computer with my American Express Optima card so I could take advantage of the warranty extension offered by the card company. According to the literature, American Express would match the manufacturer's warranty (one year parts and labor), which would give me a full two years of coverage.

I had a problem with the monitor and, after troubleshooting with Gateway technical support, decided to return it for a new one. Since the system was 18 months old and out of warranty, I planned to use the American Express Buyer's Assurance plan. To my astonishment, American Express said the item had to be registered with them within 30 days of purchase to qualify.

All along I had assumed the coverage was automatic. According to American Express, the rules are stated in several pieces of literature I received. The details may well have been there, but I never noticed them.
Rocky Drown, Chula Vista, California

Editor's note: *Consumer Watch* always advises paying for computer purchases with a credit card. The Consumer Credit Protection Act can protect you from having to pay for a computer that you never received, isn't what you ordered, or simply doesn't work—even if the company you ordered it from turns out to be disreputable or goes out of business.

But in addition to this basic protection, some cards—such as the Optima, Gold MasterCard, and Visa Gold—go even further. They extend the warranty on an item or guarantee to replace it if it's lost or stolen. According to Gerri Detweiler, a spokesperson for Bankcard Holders of America (BHA), "If you plan to take advantage of an

Spine

The s-shaped curve of your spine needs support when you sit at your computer or else the strain of

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extended warranty plan or buyer's protection program, read everything the credit card company sends you and report any claims right away to be sure that all the necessary papers are turned in on time. Don't assume the credit card company will take care of it." BHA is a Herndon, Virginia–based nonprofit organization that informs bankcard holders of their rights.

Karen Scates, director of community affairs for American Express, told us that when Drown bought his computer, the Optima card required customers to register their goods within 30 days of purchase to be eligible for the Buyer's Assurance Program. As of August, however, AmEx has eliminated the up-front paperwork. Now customers need only provide their receipts to invoke the extended warranty. The change came too late for Drown, however.

The Elusive Upgrade

I ordered SpinRite 3.1 from Gibson Research in December 1992 and paid with my credit card. The company charged my card shortly thereafter. Sometime later I got a letter from Gibson stating that due to last-minute changes to DOS 6.0, the upgrade would be delayed. For the past four months I have been checking with Gibson regularly to ascertain the status of the new product. Each time, I've been told that the changes had been completed and the product would ship shortly. But I still haven't received the upgrade.

What's up? SpinRite is a good product and Steve Gibson has an excellent reputation in the PC community, but this disregard for customers is totally unacceptable.
Patrick J. Freel, Glen Burnie, Maryland

Editor's note: The story from Steve Gibson: "We've damaged our reputation—perhaps forever—by delaying the release of SpinRite 3.1. The fact is, we screwed up. We were well into production when DOS 6.0 was announced. We received the program specifications for DOS 6.0 and realized our program would not be compatible. Given the phenomenal influence of Microsoft and its seeming ability to upgrade the entire planet on demand, we knew our upgrade would be obsolete in a matter of months. So we stopped production to make the program compatible.

"Had we known about the incompatibility with DOS 6.0 or the length of time it would take us to make SpinRite compatible, we never would have announced an upgrade.

"The good news is that SpinRite 3.1 is now shipping. Mr. Freel could have canceled his order at any time but we're glad he chose to wait."

Promises Kept

When I purchased my computer from Gateway 2000 in February, the technical support department was worse than bad. I often had to wait over an hour on repeat dial to get through the busy signal and then nearly another hour to actually speak with a support person. They always apologized, were courteous and helpful, and would spend as much time as was necessary to resolve any problem. They also assured me that they were making every effort to train new people in order to meet the unexpected demand. At the time I could under- ▶

ture could hurt your back, so work smart with our comfortable, adjustable back rest.

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PC Magazine, Cover Story, Portable PCs, August, 1993

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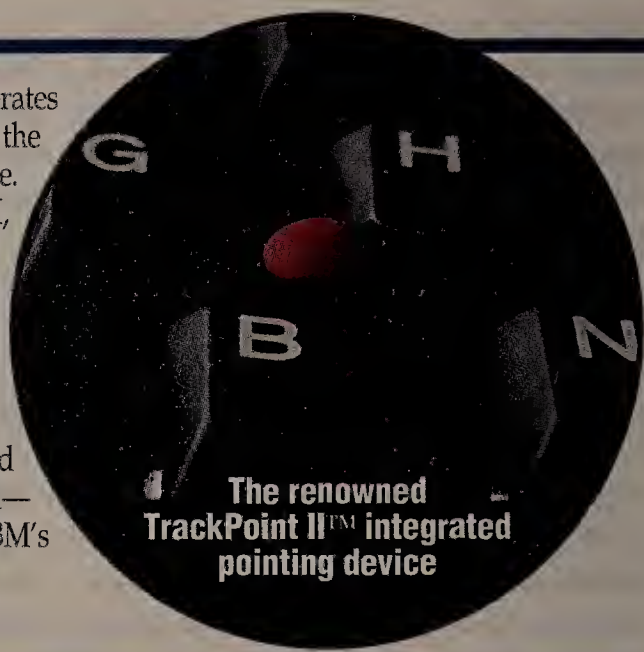

The renowned TrackPoint II™ integrated pointing device

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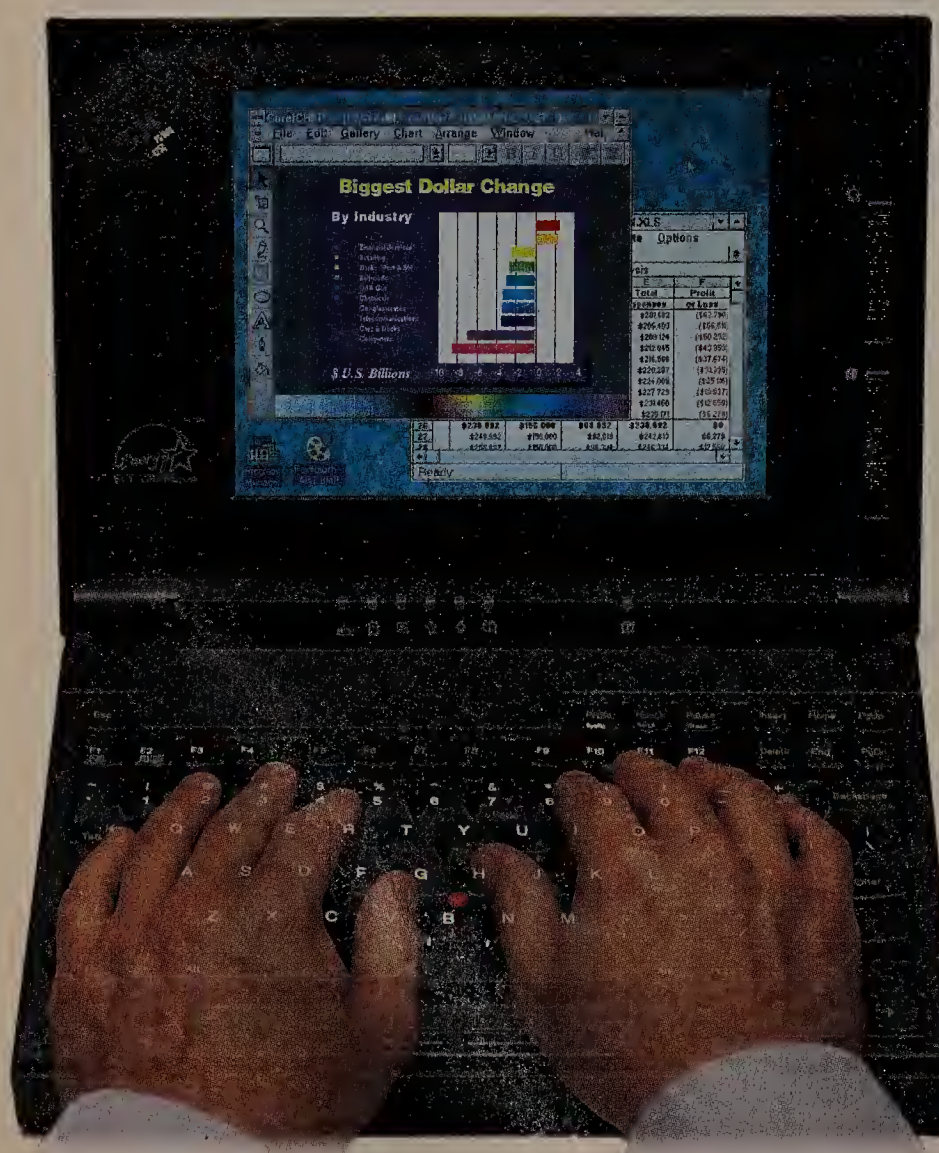

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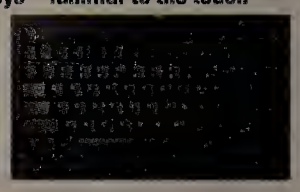
A keyboard with full-size keys—familiar to the touch

The PS/Note features an exceptional, full-size 85-key keyboard with the unique TrackPoint II pointing device. Control cursor movements with ease by moving and varying pressure on the eraser-like button.



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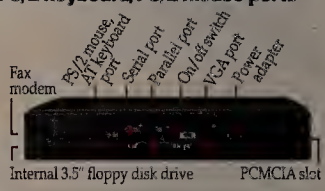

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Pointing Device
- TrackPoint II

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- Color: up to 3 hours with power management
- NiMH (no memory effect)
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Advanced Power Management
- Power management hardware and software (nearly transparent to user) for longer battery life
- Automatic and manual suspend/resume button
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"Scoring high in overall value and design, the Micro Electronic's WinBook gives you a lot for your money, including an outstanding integral trackball."

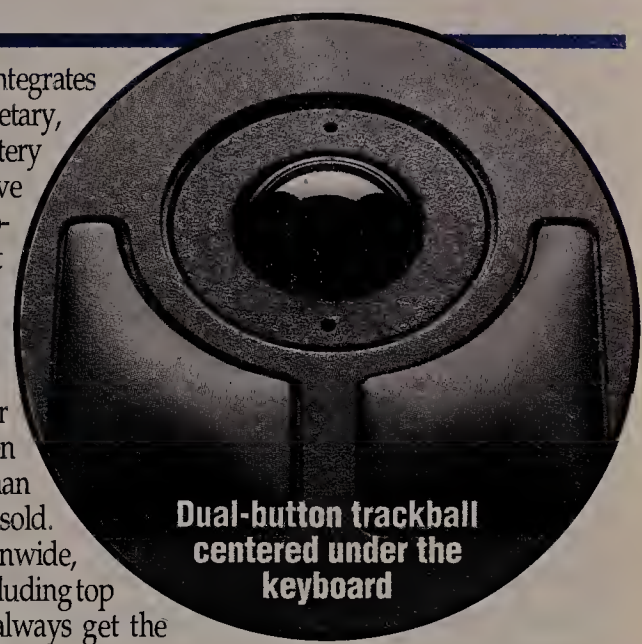
PC MAGAZINE, Portable Computing Issue, August, 1993

The WinBook by Micro Electronics™ gives you the power to run Windows and a unique, ergonomic design to make it easier to use.

It features a built-in, centered trackball which allows you to control cursor movements effortlessly without having to lift a single finger off the keyboard. Full-size keys and a sloping hand rest let you work in total comfort.

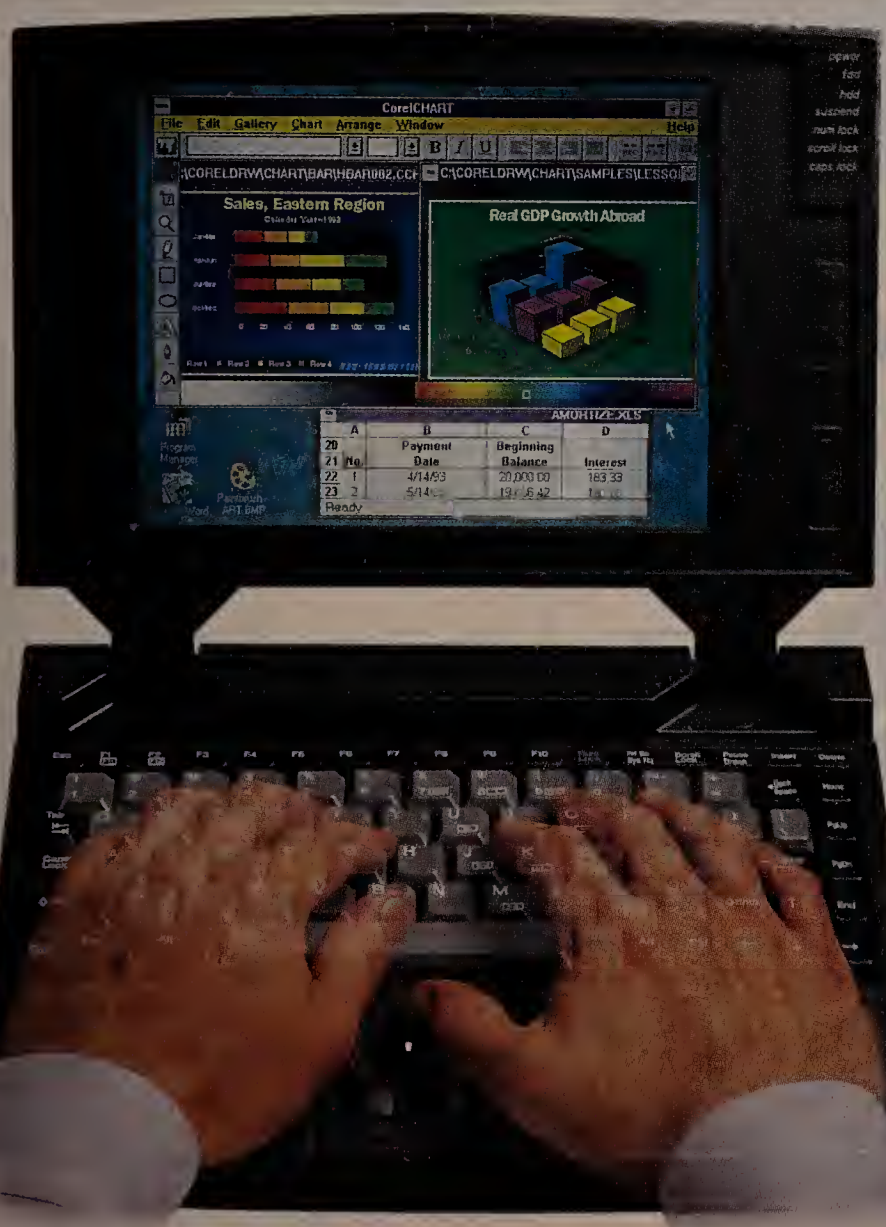
The new, upgradable, fully-static design SL enhanced Intel486SX 25MHz chip enables the CPU to operate at a 0MHz low power state. The WinBook's Pico Power Evergreen chipset integrates battery and power management with a proprietary, open loop heat regulator circuit to extend battery life and prevent heat build-up. Plus, we have fine-tuned the WinBook's screen. In monochrome and in dual-scan STN color—you get sharper, clearer images with less cursor loss.

The WinBook was engineered for Micro Electronics, a division of MEI/Micro Center, Inc. MEI is America's leading direct source for computer products. Micro Center has been selling PCs for more than 14 years—longer than IBM or Compaq—with over 736,000 units sold. With over 2.2 million satisfied customers nationwide, we have developed a superior support staff including top engineers and technical specialists. So you always get the highest quality product at the lowest possible price.



Dual-button trackball centered under the keyboard

WinBook™



WinBook 486 SX Features

Ergonomically engineered

The WinBook's ergonomic features include a sloping hand rest and keyboard, plus a centered dual-button trackball—allowing you to work in total comfort away from your desk.

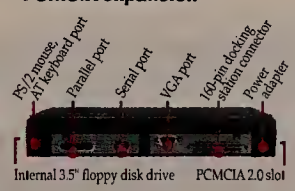
Clean, sharp color display

The WinBook's advanced, dual-scan color display gives you 99% shadow-free performance compared to other single-scan passive matrix displays. You get near active matrix quality at a passive matrix price!

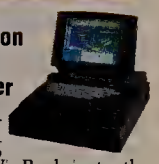
The 5.4 lb. WinBook, designed by award-winning Palo Alto Design

- Includes a 9600 baud send 4800 baud receive fax/2400 baud modem.
- Fast-acting, LCD screen for less cursor loss.
- Industry-standard PCMCIA 2.0 slot for future expandability.
- 512k video RAM.

Mouse/keyboard, parallel, serial & VGA ports plus PCMCIA expansion



Docking station gives you desktop power



With the available docking station, your WinBook instantly becomes a full-function desktop computer. The two expansion slots and drive bays allow you to add peripherals such as monitors, hard drives, CD ROMs, I/O cards or an extended keyboard. It also includes parallel, serial, PS/2 mouse, external keyboard and VGA ports. And it's just $399!

Longer battery life

The WinBook features NiMH 2200 MA batteries with gold-plated contacts. This allows it to run much longer than units with traditional NiCAD batteries—and there's no memory effect.

NEW! Intel486 SX SL Enhanced intel inside

Monochrome	Dual-Scan Color
$1699	$2399
4MB RAM 120MB HDD	4MB RAM 200MB HDD

- Intel486 SX 25MHz
- DOS & Windows
- Fax modem included!

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$299*

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*$299 after $75 mail-in rebate. For more information, call 1-800-468-0420.

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Thank you for your order!

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Specifications

Size/Weight
- 11" X 8 3/4" X 1 3/4"
- 5.4 lbs. with battery (monochrome)
- 5.9 lbs. with battery (dual-scan color)

Pointing Device
- 16mm Alps dual-action, Microsoft- compatible trackball

Battery
- Up to 3 hours with power management, over 5 hours with auxiliary battery (less 30 minutes for color)
- NiMH (no memory effect)
- 2200 MA with gold-plated contacts
- Worldwide auto-sensing AC adapter
- Quick 1.5-hour recharge

Processor and Memory
- SL enhanced Intel486 SX 25MHz CPU
- 4M8 RAM
- Pico Power Evergreen HV chipset
- 8k internal cache

Drives
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- Monochrome: Internal 120M8 (15ms) hard drive
- Color: Internal 200M8 (16ms) hard drive

Software
- Comes loaded with MS-DOS 6.0 and Microsoft Windows 3.1

Display
- Super-twisted 64 gray-scale, 10" LCD and 1024 x 768 for external monitor with 512k video RAM
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- Adjustable contrast and brightness
- Visible LED indicator on cover-down

Keyboard
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Modem
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I/O Ports
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- PCMCIA 2.0 slot
- Serial: 9-pin connector
- Parallel port
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Options
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- Docking station

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Circle 197 on reader service card

BUG WATCH

1-2-3 release 4.0 for Windows

In 1-2-3 release 4.0 for Windows, the right parenthesis in a cell gets cut off when printing to non-PostScript laser printers. A Lotus product manager said the company is aware of the problem and expects to have a fix available by mid-October.

Lotus will mail a disk free to users reporting the problem. Until the fix is available, Lotus suggests using the following work-around: Under *File • Printer Setup*, select the appropriate printer, select *Setup*, and then choose *Options*. Click the "TrueType is Graphics" check box and print. While this will slow down your printer, at least you will get the right parenthesis.

Lotus Development Corp.
800/343-5414

PackRat 5.0

In August Polaris Software shipped a maintenance release to all registered owners of PackRat 5.0 to address what the company calls "a multitude of problems," including system crashes, conversion difficulties, and sluggish performance. The maintenance release is available free of charge, but you have to register your copy of PackRat with Polaris Software before the company will send you a copy.

Polaris Software
800/722-5728, 619/592-7400

—Sarah Klein

Have you run into a software bug or hardware incompatibility? Call us at 415/978-3253 with the details. We'll investigate problems and report on those with the broadest interest.

Sarah Klein is an editorial intern for PC World.

stand why Gateway was being downgraded in computer publications for its poor service and support.

Now, however, I would like to see the company get credit for its efforts and results in turning its support situation around. Gateway has a good product and now my calls get answered within 4 to 6 minutes. The technical support staff is still as helpful as usual in guiding this novice through the trials of error messages and installation procedures.

Samuel Neiditch, San Diego

Editor's note: The April *Consumer Watch* column included letters of complaint about the lengthy delays in reaching Gateway's support department, as well as a promise from Gateway that it was working to correct the situation. Since then, the number of complaints we've received has dropped dramatically. And in our research for reviews of Gateway systems, we've found that its responsiveness has improved. The longest hold time in a recent attempt was 11 minutes. In the past we were unable to get through at all.

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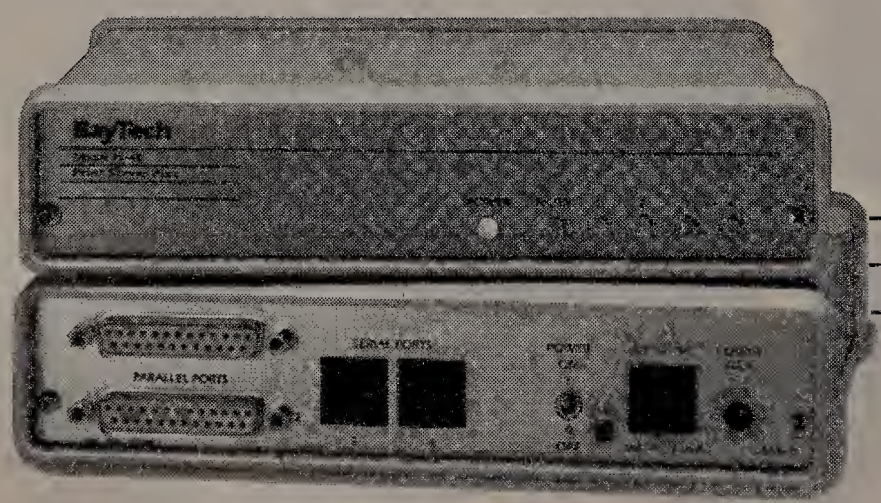

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- *Models available:*
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  - *PS-4E: 2 serial and 2 parallel*
  - *PS-4C: 4 serial*
  - *PS-MIO: HP MIO*
- *Printer Server Mode supports 32 queues on 32 file servers*

Fast Times at TI

In 1990 I bought a Texas Instruments TravelMate LT286/45. Although it was a reasonably sophisticated laptop in its day, I realized that, as with all computers, its life on the cutting edge could be measured in milliseconds. That's why I made sure the model was expandable beyond its standard 640K of RAM to 3MB.

The machine has performed well, but this year the time finally came to upgrade it. Since independent dealers were selling RAM upgrades for other TI TravelMate models for as little as $60 per megabyte, I figured I should be able to expand the capabilities of my 36-month-old computer for $200 or less. I called Texas Instruments and asked for the card that extends the memory of my laptop and was told, "Certainly, sir. That comes to $2989, plus tax and shipping." When I picked myself up off the floor, I decided to forgo this particular transaction and try to find the memory loeally. No dice. For reasons unclear to me, no one sold memory for my computer except TI.

This being America, I decided to petition the manufacturer peaceably for redress. I wrote to the president of Texas Instruments and related my long-standing appreciation of TI's products and my outrage at this prohibitory pricing. After all, I pointed out, could anyone justify charging $3000 for a few small parts when a brand-new laptop could be had for much less?

Eventually, TI offered to sell me the parts for $486.26—its manufacturing costs—but I don't think I should pay more than the fair market price.

After struggling for three months to get Texas Instruments to stand behind its not-so-old product, I'm at the point of giving up. But before I collect my pennies and buy a new laptop, I appeal to *Consumer Watch:* Can you get through to TI and find out why it won't stand behind its products?

Jess Bravin, Santa Monica, California

Editor's note: We forwarded Bravin's letter to Texas Instruments, and he finally got his memory for $250. Michael Davis, peripheral products division market communications manager for TI, explained that the cost of upgrading the laptop was high because the machine is obsolete. According to Davis, Bravin's situation is not uncommon. "What is unusual is that Bravin complained and eventually bought the memory. Most people, when faced with an excessive price for replacement parts, simply give up on the machine and buy a new one. That way they get a system that takes advantage of current technology."

Could this happen to you in three years if you bought a state-of-the-art laptop today? Possibly, given the continuing speed at which the industry changes. But since notebook sales today are higher than they were in 1990, there may be more people seeking to upgrade in three years and the market for upgrade modules could be more competitive than it is now.

Shop Talk *is researched and written by* PC World *assistant editor Christina Wood. Think you've gotten a raw deal—or a great one?* Consumer Watch *wants to hear the details. We'll investigate complaints and publish letters with the broadest interest. See page 10 for contact information.* ■

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BayTech's *Print Server Plus* allows Network users to connect up to four modems or asynchronous devices for workstation communications.

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ProAudio Spectrum-16	16-bit 44 Khz	No	No	SCSI	No	$299.00

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Circle 22 on reader service card

The Sorcerer's Apprentice

Like a magic wand, the macro capabilities in many of today's leading applications are powerful tools. There's perhaps no easier way to automate repetitive tasks such as addressing envelopes or letters and modifying reports than by writing a macro to do it for you. But in a renegade amateur's hands, a powerful macro language can wreak havoc. This month Nancy Jones, office manager of a Walnut Creek, California, firm we'll call Smith & Davis (the company requested anonymity) describes how "efficient" macros wound up disrupting operations—and how she'll prevent the same disaster from striking again. —*Ed.*

Macro Magic

When your office produces hundreds of complex documents every day, you obviously need all the automation you can get. Every time that you insert a new date in a form, add a line to a contract, or add an address and salutation to a letter, you take time that you could be spending more productively talking to clients, planning a marketing campaign, or strategizing with the boss. Macros that automate mundane tasks can make your life a lot easier, but only when the macro programmer knows what he or she is doing.

My company manages complex real estate transaetions for Fortune 1000 companies. Each day, our employees produce several packages containing personalized letters, contracts, promissory notes, status forms, authorizations, instructions, and a host of other documents. Most of these forms require individualized information, such as name, date, address, and so forth. Often this information has to be entered repeatedly in the same document.

In 1991 we switched from messy, fill-in-the-blank, printed forms to a computerized document-generation system. Our staff of 40 eventually came to rely on WordPerfect 5.1, 1-2-3, Paradox, and other software packages to produce clean, professional-looking documents. We stored the majority of these documents on an Acer 386 file server. That way, our consultants could access the forms and customize them as necessary on their desktop computers.

Switching to a PC-based document production system made our documents look better, but it didn't always mean less work. Our consultants still had to fill in the variable fields manually. To help automate data entry, I set up the Merge function in WordPerfect to allow consultants to plug in a date, salutation, address, and so forth, simply by typing in a variable code. This method simplified things, but my colleagues still had to post a list of codes by their desks that they referred to every time they put together a new package for a client.

In late 1991 we hired someone who, coincidentally, was a WordPerfect expert—or so we thought. In an effort to help streamline our time-consuming document-production process, the new employee began using the WordPerfect macro language to automate some data-entry functions.

He wrote a macro that prompted users for key client information, and then filled out the forms. As a result, the consultant never had to enter information more than once. When all the questions were answered, the system would print the perfectly formatted documents, complete with a pre-addressed envelope.

This was pure macro magic, and all the consultants in the office were delighted. They no longer had to waste time looking up merge codes, and they never had to enter the same information more than once. They were happy as well as more productive.

Macro Destruction

Over time our macro wizard began adding more and more features to the system, making it "smarter," more detailed, and more complex. Then, ten months after he was hired, he quit.

Because everyone was so happy with the macro—and because we all assumed our itinerant programmer knew what he was doing—no one had asked him to explain how he built the macro or to document it. Everything was going along just fine, in fact, until we started adding more clients to our roster and had to make changes to the documents. We were suddenly faced with a gigantic WordPerfect macro that consumed 70 printed pages—and that no one understood.

As it turned out, our departed employee had taken several WordPerfect classes, but never so much as one class in programming. Because I turned out to be the most experienced WordPer-

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fect user in the office, the task of unraveling this tangled mess fell to me.

I spent nearly two months working late, poring over the WordPerfect manual, talking to WordPerfect's technical support, squinting at the tildes and other strange figures on the computer screen, and trying to decipher how this monster worked. It was a hair-pulling, teeth-grinding task. Meanwhile, our consultants were unable to use the macro to service new clients, and they had to revert to filling out forms manually.

When we added another file server to our network and tried to change the directory mapping so we could move the macro to the new server, things really fell apart. Turns out our wayward programmer had built WordPerfect's path into the macro, and when we moved WordPerfect, the macro couldn't find it. In exasperation, we hired a WordPerfect consultant to fix everything, and the office was "down" for a day. The estimated cost of my time, the consultant's, loss of productivity, and the inconvenience posed to our field offices, neared $8000.

The Moral of the Story

Thanks to the consultant, we had a functioning document-generation system within a matter of days. But this time, it could be changed as needed. Today I know every last detail about how our document-generation macro works, and I've been careful to see that others in the office know, too.

I learned important lessons from this experience. First, make sure that macro programmers communicate their plans to a project supervisor, and that they always work with someone who has been trained in programming. Second, require the macro-makers to document everything in English, and ask for an English-language list describing the variables used and where they appear in the macro. Third, hire a consultant who can act as a coach when necessary. And finally, make sure you don't get complacent about someone's purported technical expertise.

As a sage once said, "A little knowledge is a dangerous thing."

Edited by Bronwyn Fryer

Bronwyn Fryer is a contributing editor for PC World. *If you use PCs to manage people and other resources in a business environment,* Real Problems, Real Solutions *wants to hear from you. See page 10 for contact information.*

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Secondary caches unlock the full performance potential of your CPU. Gateway VESA systems come standard with 128KB cache, and the award-winning DX2-66V has 256KB cache.

Your Choice Of Software

Only Gateway gives you a choice of top-shelf application software. VESA local bus and PCI systems include options such as Microsoft® Word for Windows,™ MS Excel,™ Borland® Paradox® and Quattro® Pro for Windows. Then we add Central Point's Tools on Top™ utility software, based on the award-winning PC-Tools for Windows. Systems with a CD-ROM drive include Gateway's System CD containing

FOR THE FEWEST BUCKS

Microsoft's Multimedia Pack,™ the Gateway Mall and much more. All software is pre-installed on your system at no extra charge.

AnyKey® Keyboard

Don't settle for a rigid 101-keyboard when you can have the flexibility of Gateway's exclusive 124-key AnyKey keyboard with programmable macros and keyboard remapping capabilities.

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CD-ROM Drive

All DX2 VESA systems come standard with a CD-ROM drive, giving you access to exciting new applications, databases and entertainment programs. All Gateway systems can be easily upgraded to include a CD-ROM.

Expandability

For those of you who still want to jazz up your PC ensemble, we're giving you all the instruments you need for expansion. You get four external drive bays for floppies, a CD-ROM drive, tape backup, and don't forget all the media of the future. Three internal drive bays allow you to easily add hard drive space. Two VESA slots assure upgradeability to tomorrow's totally cool graphics and disk controller technology; and five ISA slots are compatible with 16-bit technologies.

Gateway has always had a reputation for marching ahead of the crowd by giving you the ***greatest*** values. Our award-winning VESA systems are no exception!

Standard with VESA systems is our new Baby AT case measuring 16.9-inches wide, 6.6-inches high and 16.8-inches deep.

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GET THE BIGGEST VALUE

The tall and short of it is: Gateway 2000 elevates value to enormous levels on our integrated mini desktop systems...but still gives you pint-sized prices. We've gone to extremes to bring you all new mini desktop configurations with colossal features and performance in a new case. Whether you need a 486SX-25 processor, a 486DX2-66 processor, or anything in-between, Gateway has the system for you. And with prices lower than ever, you get a huge value without having to pay an arm and a leg.

Big Performance/Little Prices

Check out Gateway's new 4DX2-66 mini desktop — it's a small package that packs a big punch for under $2,000! While other companies might slash their prices, you could get the short end of the stick when it comes to features. Gateway won't short-change you on anything. You get a 66MHz 486DX2 processor, 128KB cache, a 424MB hard drive, 4MB RAM and fast video performance. Our 4SX and 4DX models come standard with Microsoft Works™ for Windows; 4DX2 models come with an extended selection of application software. And all mini desktop models come standard with MS DOS® 6 and MS Windows™ 3.1. All application software comes pre-installed on the hard drive at no extra charge.

Local Bus Video

Our new integrated local bus video provides up to twice the video performance found in our previous mini desktop systems. In fact, Gateway's mini desktop video performance is similar to that found in many of our competition's high-end systems. With up to 1MB video DRAM, you get 1024 x 768 resolution and an array of colors. All this on our 14-inch CrystalScan non-interlaced, .28mm dot pitch color monitor.

Price/Performance

How can we give you all these features at such low prices? Gateway's engineers went out on a limb to design our mini desktops to include many subsystems incorporated on the motherboard. This means less cost to us, and a giant savings for you!

ON OUR SMALLEST DESKTOP SYSTEMS

Increased Expandability

You won't have any growing pains with Gateway's new integrated mini desktop cases. They're small, but you get more flexibility and expandability than ever before. These cases come with one internal and one external 3.5 inch drive bays, and two external 5.25 inch drive bays so you can add a tape backup, CD-ROM drive or another floppy drive. You also get five expansion slots: more than you'll find in most small footprint PCs. And all Gateway mini desktop systems are upgradeable to Pentium technology.

With the ***coolest*** features at miniature prices, our mini desktop systems give you an unbeatable value. Call your Gateway sales representative today for more information on these power-packed mini desktop systems.

You get greater expandability with our new mini desktop cases, measuring 16.9-inches wide, 4.4-inches high and 15.9-inches deep.

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"You've got a friend in the business."®

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GET THE HARDEST HITTING MULTIMEDIA

Although it looks difficult, you can easily put a multimedia spin on your Gateway PC by purchasing our specially priced multimedia kit. With it you can access the most powerful productivity packages, the most realistic games and the latest multimedia applications.

Multimedia Upgrade kit

Everything you need to add multimedia to your PC is included in this specially priced kit! You get:

Sound Blaster™ 16 Sound Card with Advanced Signal Processing.

Simply the best sound card available! This 16-bit PC audio card offers CD-quality sound. Yamaha® FM music synthesizer, MPU-401 MIDI interface, joystick connector, built-in CD-ROM interface, and more. The Advanced Signal Processing chip delivers 4:1 real-time hardware data compression while reducing CPU demands by up to 65%. Provides 100% compatibility with all Sound Blaster applications, plus DOS and Windows sound support. You also get two Labtec® speakers that attach to your PC monitor.

Double-Speed CD-ROM Drive.

Kit comes with a high-performance double-speed CD-ROM drive. When you're not using it to run computer programs, it can play your favorite music CD's. You also get our free system CD with Microsoft Multimedia Pack™ and more!

Kit Price: $395 (with system purchase)

Altec Lansing Speakers ACS-300 with Subwoofer

Get superior stereo sound with these top-rated Altec Lansing Speakers. This system includes two magnetically shielded, powered two-way satellite speakers and a separately powered subwoofer which uses a unique multi-path acoustic chamber design. The digital signal processing (DSP) circuitry creates full rich sound, presence and ambiance. **$219** (with system purchase)

Software

Check out our latest software titles too. This new wave of exciting applications will forever change the way you learn, work and play!

THAT IS EASIEST ON YOUR BUDGET

MECC Education Pack

MECC, one of the leaders in education software has bundled four of their most exciting programs including: The Oregon Trail; Money Works/Clocks; Story Book Weaver; and Super Munchers. **$59** (with system purchase)

Just Grandma and Me™

Watch your child's eyes light up with one of the most popular interactive, animated stories for children on the market. Just Grandma and Me is a multimedia smorgasbord of sound effects, music and animations. **$42** (with system purchase)

The TIME Almanac 1993

Experience tomorrow's technology with the TIME almanac. This package now offers a comprehensive collection of 15,000 TIME magazine articles and nearly 60 minutes of current and historical videos. **$75** (with system purchase)

Microsoft Encarta Encyclopedia

Where typical encyclopedias end, Microsoft Encarta begins. Bringing learning to life with words, images, animations and sounds, Encarta includes the complete text of the 29-volume 1992 Funk and Wagnall's New Encyclopedia. **$249** (with system purchase)

Call for details on other exciting software packages.

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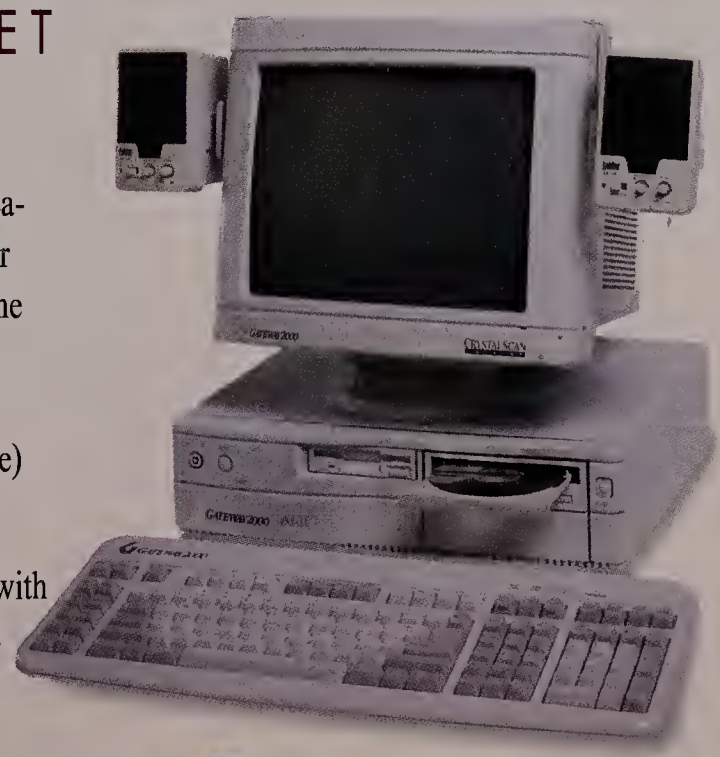

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GET THE STRONGEST SERVICE AND SUPPORT

We're committed to bending over backward to please our customers. Gateway employees understand that there may be a time when your computer makes you feel a little weak in the knees. Never fear — our Midwestern people know the importance of a friendly voice and a helpful attitude on the other end of the phone.

Every Gateway system comes with excellent after-the-sale support. You get a **30-day money-back guarantee**. So, if you're not completely satisfied with your system, you can send it back within 30 days for a refund.

All Gateway 2000 systems have a **one-year limited warranty** and telephone **technical support for the life of the system**. When you need help with your PC, you want someone who will jump through hoops to help you. That's what you'll get with our support departments.

Gateway's **automated fax service** will supply you with detailed documentation on over 150 technical subjects. You'll also get **a lifetime BBS membership** for additional technical support and on-line forums.

We offer **on-site service** to most locations in the country (factory service only for notebooks). And **replacement parts** leave our factory as quickly as possible; we pay overnight shipping. For details on our guarantee, warranty and on-site service programs, please call for a free written copy of our policies.

We also make it easy for you to buy a Gateway PC, with **convenient payment options** including major credit cards and C.O.D. terms. Net 30-day terms and leasing options are also available to qualified commercial customers.

Energy Star Program

The Environmental Protection Agency's Energy Star Program is fast becoming the industry standard in the "green" movement. PCs and monitors with the Energy Star logo are capable of consuming 30 watts or less of electricity. All Gateway 2000 desktop systems, with the exception of our new Pentium-based PCs, are EPA Energy Star compliant.

Introducing The Gateway DuoLine MasterCard® Card

Here's another value-added way to get the latest technology: the Gateway 2000 DuoLine MasterCard now available only through Gateway 2000.

This innovative card enables you to make purchases from Gateway and anywhere else MasterCard is accepted, by giving you two lines of credit — one for Gateway purchases and one for all other purchases. For Gateway purchases, the card has no annual fee and a low variable interest rate of just 12.9% APR. For purchases elsewhere, you get a variable interest rate of 13.9% APR and a low $18 annual fee.* If you already have a MasterCard, you may also apply for a Gateway DuoLine MasterCard. Lines of credit will vary by individual. For an application, call 800-846-1781.

**Cash advance fee is $1 plus 2% of the amount of the cash advance, but not less than $5 nor more than $10. The Gateway 2000 Duoline MasterCard is issued by Dial National Bank.*

FOR YOUR WEAKEST MOMENTS

At Gateway 2000, we strive to be extremists when it comes to bringing you the ***highest***-performance systems, with the ***most*** features at the ***lowest*** prices...for the ***greatest*** value in the PC industry. We are committed to giving you the ***strongest*** after-the-sale support. And we will continue to find the ***"greenest"*** ways to increase energy efficiency and protect the environment. Call your Gateway 2000 sales representative today!

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GATEWAY 2000'S COOLEST PCS

4SX-33

- Intel® 25MHz 486SX Processor
- 4MB RAM
- 3.5" Diskette Drive
- 212MB 13ms IDE Hard Drive
- Intel Pentium™ Technology Ready
- Local Bus Graphics Accelerator w/ 512KB DRAM
- 14" Color CrystalScan® 1024NI
- New Mini Desktop Case
- 5 16-Bit ISA Slots
- 101-Key Keyboard
- Microsoft® Mouse
- MS-DOS,® Windows™ & Tools
- MS Works for Windows™ 2.0
- EPA Energy Star Compliant

$1295 4SX-25 **$1275**

4DX-33

- Intel 33MHz 486DX Processor
- 4MB RAM
- 3.5" Diskette Drive
- 212MB 13ms IDE Hard Drive
- Intel Pentium Technology Ready
- Local Bus Graphics Accelerator w/ 512KB DRAM
- 14" Color CrystalScan 1024NI
- New Mini Desktop Case
- 5 16-Bit ISA Slots
- 101-Key Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- MS Works for Windows 2.0
- EPA Energy Star Compliant

$1495

4DX2-50

- Intel 50MHz 486DX2 Processor
- 4MB RAM, 128KB Cache
- 3.5" Diskette Drive
- 424MB 13ms IDE Hard Drive
- Intel Pentium Technology Ready
- Local Bus Graphics Aecelerator w/ 1MB DRAM
- 14" Color CrystalScan 1024NI
- New Mini Desktop Case
- 5 16-Bit ISA Slots
- 124-Key AnyKey®Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- Choice of Application Software
- EPA Energy Star Compliant

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4DX2-66

- Intel 66MHz 486DX2 Processor
- 4MB RAM, 128KB Cache
- 3.5" Diskette Drive
- 424MB 13ms IDE Hard Drive
- Intel Pentium Technology Ready
- Local Bus Graphics Accelerator w/ 1MB DRAM
- 14" Color CrystalScan 1024NI
- New Mini Desktop Case
- 5 16-Bit ISA Slots
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- Choice of Application Software
- EPA Energy Star Compliant

$1995

4SX-33V

- Intel 33MHz 486SX Processor
- 4MB RAM
- 5.25" & 3.5" Combo Drive
- 212MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
- VLB Graphics Accelerator w/1MB DRAM
- 14" Color CrystalScan 1024NI
- New Baby AT Case
- 5 ISA & 2 VESA/ISA Slots
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- Choice of Application Software
- EPA Energy Star Compliant

$1495

4DX-33V

- Intel 33MHz 486DX Processor
- 8MB RAM, 128KB Cache
- 5.25" & 3.5" Combo Drive
- 424MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
- VLB Graphics Accelerator w/1MB DRAM
- 14" Color CrystalScan 1024NI
- New Baby AT Case
- 5 ISA & 2 VESA/ISA Slots
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- Choice of Application Software
- EPA Energy Star Compliant

$1995

4DX2-50V

- Intel 50MHz 486DX2 Processor
- 8MB RAM, 128KB Cache
- 3.5" Diskette Drive & CD-ROM
- 424MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
- VLB ATI™ Ultra XLR 2MB Graphics
- 15" Color CrystalScan 1572FS
- New Baby AT Case
- 5 ISA & 2 VESA/ISA Slots
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- Choice of Application Software
- EPA Energy Star Compliant

$2295

66MHz Best Buy

- Intel 66MHz 486DX2 Processor
- 8MB RAM, 128KB Cache
- 3.5" Diskette Drive & CD-ROM
- 424MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
- VLB Graphics Accelerator w/1MB DRAM
- 15" Color CrystalScan 1572FS
- New Baby AT Case
- 5 ISA & 2 VESA/ISA Slots
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- Choice of Application Software
- EPA Energy Star Compliant

$2495

4DX2-66V

- Intel 66MHz 486DX2 Processor
- 16MB RAM, 256KB Cache
- 3.5" Diskette Drive & 2X CD-ROM
- 424MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
- VLB ATI Ultra XLR 2MB Graphics
- 15" Color CrystalScan 1572FS
- New Baby AT Case
- 5 ISA & 2 VESA/ISA Slots
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- Choice of Application Software
- EPA Energy Star Compliant

$2995

P5-60 Best Buy

- Intel 60MHz **Pentium**™ Processor
- 8MB RAM, 256KB Cache
- 3.5" Diskette Drive & 2X CD-ROM
- 424MB 13ms IDE Hard Drive
- PCI ATI Ultra XLR 2MB Graphics
- 14" Color CrystalScan 1572FS
- New 300W Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- MS Works for Windows 2.0

$2995

P5-60

- Intel 60MHz **Pentium**™ Processor
- 16MB RAM, 256KB Cache
- 3.5" Diskette Drive & 2X CD-ROM
- 528MB 12ms IDE Hard Drive
- PCI ATI Ultra XLR 2MB Graphics
- 17" Color CrystalScan 1776FS
- New 300W Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- 124-Key AnyKey Keyboard
- Microsoft Mouse
- MS-DOS, Windows & Tools
- Choice of Application Software

$3995

Software Choices

If a system comes with "choice of application software," choose one of the following packages:

- Microsoft Excel for Windows™
- Microsoft Word for Windows™
- Microsoft Word and Bookshelf'92, CD-ROM Edition
- Microsoft PowerPoint for Windows
- Microsoft Projeet for Windows™
- The MS Entrepreneur Pack(Works, Publisher, Money, and games)
- Borland Paradox® and Quattro®Pro for Windows

Due to the volatility of the DRAM market, all prices are subject to change.

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SOFTWARE

Microsoft Office™— You can upgrade from a choice of application software to Microsoft Office, CD-ROM version, for only **$99**! This single package has all the leading Windows applications: Word, Excel and PowerPoint.

Choice of Application Software—If the system you want comes with MS Works for Windows, you can upgrade to a choice of application software for only **$100**.

COMMUNICATIONS

TelePath™ II Fax/Modem

Internal fax/modem, 14,400bps modem, V.32bis, with 9,600bps fax capability. Package includes data and fax communication software plus a CompuServe® trial membership. **$159**

Cardinal® 2400 Fax/Modem

Internal fax/modem, 2,400bps modem, V.22bis, with 9,600bps fax capability. Package includes QModem and WinFax Lite. **$49**

Intel EtherExpress™

The one board you can use for all your Ethernet adapter needs. Providing 8- and 16-bit support for twisted-pair, thin-and thick-wire Ethernet cabling, it sets a new performance standard for 16-bit LAN adapters by providing full support for standard network operating systems.
$105 *Twisted Pair or BNC Kit (BNC Kit includes cable, connector, terminator and card)*

Gateway 2000 Ethernet Adapter

This third-generation adapter manufactured by 3Com features parallel tasking architecture which speeds up packet processing and improves adapter performance. Plus, its high level of integration greatly reduces the number of discrete components, lowering cost and increasing reliability.
$105 *Twisted Pair*
$125 *BNC Kit (includes cable, connector, terminator and card)*

Colorado Memory Systems™ TBU

250MB internal automatic tape backup unit copies up to 9.5MB per minute with high-speed data compression. Comes with easy-to-use DOS software, one tape and cable. **$175**

MONITORS

CrystalScan® 17-Inch Monitors

Non-interlaced, color monitor. If your system comes with a 14-inch monitor, you can upgrade to this monitor for $600. If your system comes with a 15-inch monitor, you can upgrade for **$520**. *(Prices good only for upgrades at the time of system purchase.)*

Gateway CrystalScan 2076LE

This high-performance, 20-inch, .30 dot pitch color monitor is perfect for CAD, imaging and graphic design. It has a maximum resolution of 1280 x 1024 at 80Hz refresh, plus it features a Trinitron CRT and Super Fine Pitch™ aperture grille for bright images and vibrant colors. You can upgrade to the 20-inch monitor for **$1,590** if your system comes with a 14-inch monitor. If your system comes with a 15-inch monitor you can upgrade for **$1,510**. *(Prices good only for upgrades at the time of system purchase.)*

PRINTERS

Panasonic® KX-P2123 Color-Capable Printer

Add color to your documents with this 24-pin dot matrix printer. Includes Adobe Type Manager.®
KX-P2123 **$259**
KX-P2123 Color Option **$50**

Epson® Stylus™ 800 Ink Jet Printer

Great laser quality at an even greater value. Measuring only 17 inches by 10.5 inches, the Stylus 800 has 7 different typefaces and prints an extra-quiet 150 characters per second at 360 dpi Parallel cable included.

Gateway 2000 Price	**$339**
Epson Mail-in Rebate*	**-$50**
After Rebate Cost	**$289**

*Your mail-in rebate will be delivered with your Epson printer. This special price is only good for orders taken through October 31, 1993.

Epson ActionLaser 1500 Laser Printer

Superior output in a high-quality laser printer. The ActionLaser delivers professional-quality printouts with crisp, sharp images, black blacks and smooth, "jag-free" lines. It also features a fast six-page per minute print speed, 14 resident fonts, 300 x 300 dpi, and 1MB memory expandable to 5MB. Parallel cable included. **$669**

The software and peripherals listed here are sold only with the purchase of a system. For details on our complete line of extras for Gateway customers, ask for our special add-on components division when you call.

We offer many other system options and upgrades. Call today!

SERVICE

Every Gateway 2000 system is backed by:
- 30-Day Money-Back Guarantee
- One-Year Limited Warranty
- Lifetime Toll-Free Technical Support
- On-Site Service Available to Most Locations
- Lifetime BBS Membership
- FaxBack™ Automated Fax Service

Details about our warranty, guarantee and on-site service program are available upon request.

MICROSOFT® WINDOWS™ READY-TO-RUN

TOOLS ON TOP FROM CENTRAL POINT

Tools on Top™ is now included on all Gateway 2000 mini desktop, desktop and tower systems. Program includes file manager, desktop and emergency disk portions of Central Point's award-winning PC Tools for Windows.

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Prices and configurations are subject to change without notice. Prices do not include shipping.

Connecting Your Notebook To The LAN Does Take A Little Time.

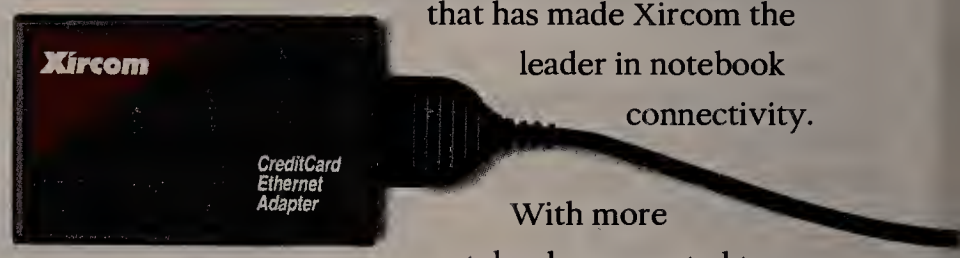
In a matter of seconds, Xircom can connect any notebook to any local area network anywhere.

Simply slide a Xircom CreditCard LAN Adapter into your notebook's PCMCIA slot or plug a Xircom Pocket LAN Adapter into your notebook computer's parallel port.

That's it. There are no tools, batteries or AC adapters required.

It's this plug-and-play simplicity that has made Xircom the leader in notebook connectivity.

3.6 Seconds To Be Exact.



With more notebooks connected to more LANs than all other LAN adapter vendors combined.

We make a full line of Pocket and CreditCard adapters for local, remote and cordless notebook-to-LAN connections. All backed by a two-year warranty and a lifetime, half-price upgrade policy.

Call 1-800-874-7875 ext. 24K for the name of a Xircom dealer near you. And get your notebook on your LAN.

Fast.

Xircom

The easiest way to go from notebook to network.

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Circle 240 on reader service card

Of Sharks, LANs, and a Crystal Ball

I'm a sucker for a product with an innovative style. That's why this month's *Business Fixtures* features products that seem to have nothing to do with each other: a new personal information manager, a do-it-yourself local area network, and a spreadsheet forecasting program.

These iconoclastic products use the computer for everyday tasks. The PIM, Sharkware, based on the writings of best-selling business author Harvey Mackay, serves up large helpings of his philosophy. The installation guide for the LAN, Coactive Connector, titled *How To Hook This Stuff Up*, uses only 56 graphics-rich pages to tell you just that. And Crystal Ball, the spreadsheet forecast package, uses a technique—sure to shock your accountant—called Monte Carlo simulation to answer questions like, "What are the chances we'll finish this project on time?"

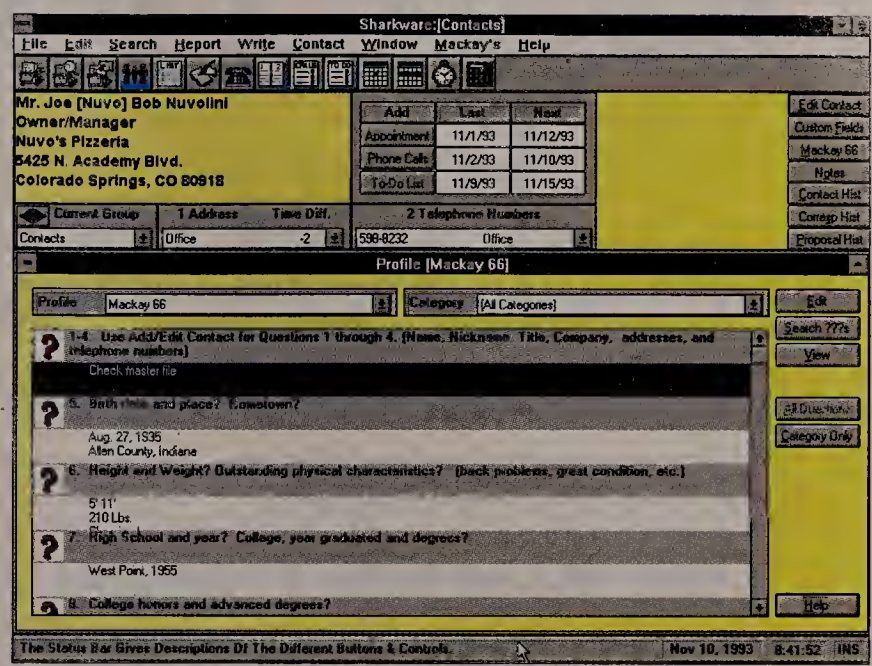
Sharkware 1.0

This PIM from CogniTech Corporation takes its name from Mackay's *New York Times* number one best-seller, *Swim with the Sharks Without Being Eaten Alive.* The Windows-based program embodies Mackay's optimistic sales credo with every icon and mouse click. His commonsense one-liners pop up frequently. (This feature, thankfully, can be turned off.)

One seminal Mackay quote sets the overall tone for the package: "It's not who you know, it's what you know about who you know that matters." Sharkware is designed to help you keep track not only of names, addresses, and phone numbers but also such related facts as birthdays, spouses' and children's names, height, weight, physical condition, and other personal data. This is a good feature, but it's not unique to this PIM. (See "Are PIMs Ready for Prime Time?" in the August issue.)

By Thom Foulks

Sharkware's data keeping, on the other hand, goes beyond that of its competitors. Four data profiles prompt you to store additional information about competitors, bosses, and prospective employers or employees. For example, the Mackay Job Finder asks detailed questions about the job, the interviewer, the company, and so forth. It's a great tool for tracking your own job search efforts.



Sharkware lets you attach a total of 133 descriptive items to each person in your file (though only the name is mandatory). If that's not enough, you can customize fields. You can also delete existing fields to save storage.

If you make a lot of phone calls and have a modem, use the Sharkware auto-dialer to save wear and tear on your dialing finger. It will automatically time your calls and log phone activity to make billing your time a breeze. And there's more. Click the Write-a-Letter icon and Sharkware pops up Word for Windows or Ami Pro (but not WordPerfect) with an address and a salutation already inserted; it works the same way for envelopes and labels. Need to reschedule an appointment or a meeting? Drag the old entry to the new date and time, drop it there, and your calendar, appointment list, and to-do list update automatically. You can print the data to produce a contact list, calendar, to-do list, phone call log, or other summaries.

Sharkware's weakest point is its approach to data collection: You'll have to adopt Mackay's contact management philosophy to get the system's full value, and that means spending a lot of time entering data about people. (A data import feature should be available by the time you read this.) Mackay addresses this shortcoming by simply encouraging self-discipline: "I cannot stress enough how important it is for you to work with this tool every day and to make yourself proficient with it."

> A PIM WITH AN ATTITUDE: "If the house is on fire, forget the china, the silver, and the wedding album—grab your data files."

You'll also need state-of-the-art hardware—a 386 or better with 4MB of RAM and at least 7MB of hard disk space. A modem for auto-dial is also a good idea. If you're one of the millions of Mackay's readers, you'll want the $129.95 Sharkware—it's a Foulks Favorite. As Mackay puts it, "There's no future in saying it can't be done."

Coactive Connector

If you've dealt with a LAN, you may share my skepticism when LAN manufacturers claim their systems are easy to set up and use. I'm sure there are nerds who wouldn't quibble. But when an average user, who couldn't care less about things like IRQs and twisted pairs, tackles one of these systems, the word *easy* doesn't spring to mind.

I, however, will fearlessly go on record to say that anyone who's ever plugged a telephone into the wall and hooked up a printer to a computer can install and

use Coactive Computing's Coactive Connector. It truly is that easy—even when you're connecting a PC and a Mac. Proving that to myself took less than an hour with two PCs and a Macintosh LC. (Half my time was spent rereading the instructions because I thought it was all too simple. I kept looking for the "gotcha" I was sure lurked somewhere. There wasn't one.)

There are no cards to install (you don't even open the computer), no special wiring, no hard drive formatting, and no skull-banging sessions with thick manuals. Coactive Connector's adapters connect to a standard PC parallel port (your printer can be attached to the adapter) or Macintosh AppleTalk port, and standard modular-jack telephone wires link the computers. The adapters have their own CPU and RAM, so they require only 65K of your PC's RAM. Once the connections are made, a menu-driven software installation guides you through the rest rapidly.

Anyone who's ever plugged in a phone and hooked up a printer to a computer can install and use Coactive Connector.

Anyone who hasn't dealt with file sharing across a LAN will have some learning to do. For instance, sharing programs between PCs requires LAN-compatible software, and you'll need to create a special folder for shared files on the Mac. PC and Mac programs remain foreign to each other, but some software developers have created a PC and a Mac version of their programs so that each version can work with the other's data files—Claris with FileMaker Pro and Quark with QuarkXPress, for example. The small manuals that come with Coactive Connector cover this.

Coactive Connector is no speed demon. It's simple because it uses the ubiquitous parallel port, and data doesn't move as quickly through that port as through, say, an ethernet network port. But the software is easy to use, and at $149 per machine (DOS and Windows versions are included) you can't match the price. Don't look for it at your local LAN specialist's shop—computer and office product superstores are selling Coactive Connector.

Crystal Ball 3.0

The publishers of major spreadsheet packages such as Lotus 1-2-3 and Excel like to brag about their what-if capabilities. Trouble is, a what-if computation can produce misleading or useless data if not set up properly—and few users have the statistical or analytical training to orchestrate such calculations or make sense of the data they produce.

So take a look at Decisioneering's Crystal Ball 3.0, the first major add-in for 1-2-3 release 4.0 and one of the top-selling add-ins for Excel 4.0. Crystal Ball automates the what-if process, and a 245-page manual helps you set up the proper values that need to be analyzed.

If you're a landlord, for example, Crystal Ball can predict probable cash flow, considering varying rent adjustments, occupancy rates, property taxes, and interest rates. Or a car dealer could project sales based on a variety of models and sticker prices. Once you enter known and assumed data into the spreadsheet, Crystal Ball generates random comparisons to develop a most-likely statistical scenario.

A graph on your screen then shows you the highest-probability combinations of data. You can choose bar, area, or line graphs and easily see the peaks and valleys of data combinations.

Monte Carlo simulation is the root of this magic. This technique doesn't try to analyze every potential value for a given variable assumption, but instead generates a random sampling of the input values within the ranges you specify. It can run through 1000 potential scenarios in seconds.

Sound like heady stuff? Well, it is. For the forecast data to be meaningful, the assumption data you key in must have some relationship to reality, and you should supply as much known data as possible to avoid getting garbage out from garbage in. But anyone who can set up a spreadsheet can use Crystal Ball. You need only gather the input data (a valuable exercise for any business), identify the assumption data, and tell Crystal Ball where to store the forecast data. You can purchase Crystal Ball directly from the publisher for $295.

Quick Fixtures

My CD ROM drive and Thunderboard sound card have been getting a workout from my new CD ROM: 1000 of the World's Greatest Sound Effects, from Hollywood's Valentino Sound Effects Library. It has everything from a robin's chirp and a lion's roar to a Model T's *ah-oogah* horn. The sounds are indexed and individually selectable as 8- or 16-bit WAV files on this $49.95 disk from InterActive Publishing Corporation. The disk's highlight, however, is a program called MultiMedia Sound Studio. In Windows it looks like a stereo rack system and provides single-menu control over all CD ROM sound sources (WAV, MIDI, or CD audio disk). Slickest multimedia handler I've seen.

Are more and more of your graphics files stored in the tightly compressed JPEG format? Consider the WinJPEG viewer. Version 2.41 offers exceptional on-screen image quality not only for JPEG files, but also GIF, TIFF, and Targa images. WinJPEG's outstanding feature is a full-screen slide show, which you can set up in seconds for a multitude of files (even across a LAN). More than just a viewer, it offers crop-and-save capabilities—surprising power for a $20 shareware item. Look for WINJP231.ZIP on PC World Online.

- **Coactive Connector**
  Coactive Computing Corp.
  800/825-2638, 415/802-1080
  Reader service no. 688
- **Crystal Ball 3.0**
  Decisioneering
  800/289-2550, 303/292-2291
  Reader service no. 658
- **Sharkware 1.0**
  CogniTech Corp.
  800/947-5075 (orders), 800/485-4275 (information), 404/518-4577
  Reader service no. 690

Thom Foulks is a contributing editor for PC World.

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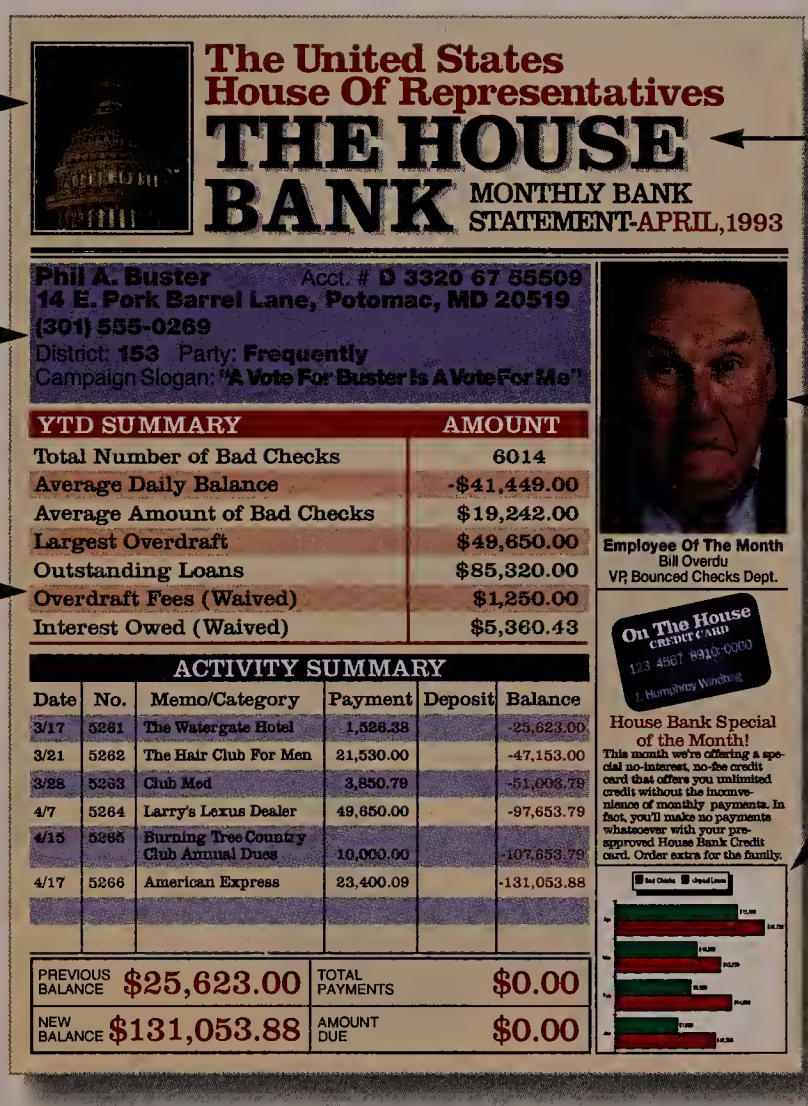

The United States House Of Representatives

THE HOUSE BANK

MONTHLY BANK STATEMENT-APRIL,1993

Phil A. Buster Acct. # D 3320 67 55509
14 E. Pork Barrel Lane, Potomac, MD 20519
(301) 555-0269
District: 153 Party: Frequently
Campaign Slogan: "A Vote For Buster Is A Vote For Me"

YTD SUMMARY	AMOUNT
Total Number of Bad Checks	6014
Average Daily Balance	-$41,449.00
Average Amount of Bad Checks	$19,242.00
Largest Overdraft	$49,650.00
Outstanding Loans	$85,320.00
Overdraft Fees (Waived)	$1,250.00
Interest Owed (Waived)	$5,360.43

ACTIVITY SUMMARY

Date	No.	Memo/Category	Payment	Deposit	Balance
3/17	5261	The Watergate Hotel	1,526.38		-25,623.00
3/21	5262	The Hair Club For Men	21,530.00		-47,153.00
3/28	5263	Club Med	3,850.79		-51,003.79
4/7	5264	Larry's Lexus Dealer	49,650.00		-97,653.79
4/15	5265	Burning Tree Country Club Annual Dues	10,000.00		-107,653.79
4/17	5266	American Express	23,400.09		-131,053.88

PREVIOUS BALANCE	$25,623.00	TOTAL PAYMENTS	$0.00
NEW BALANCE	$131,053.88	AMOUNT DUE	$0.00

Employee Of The Month
Bill Overdu
VP, Bounced Checks Dept.

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Circle 78 on Reader Service Card

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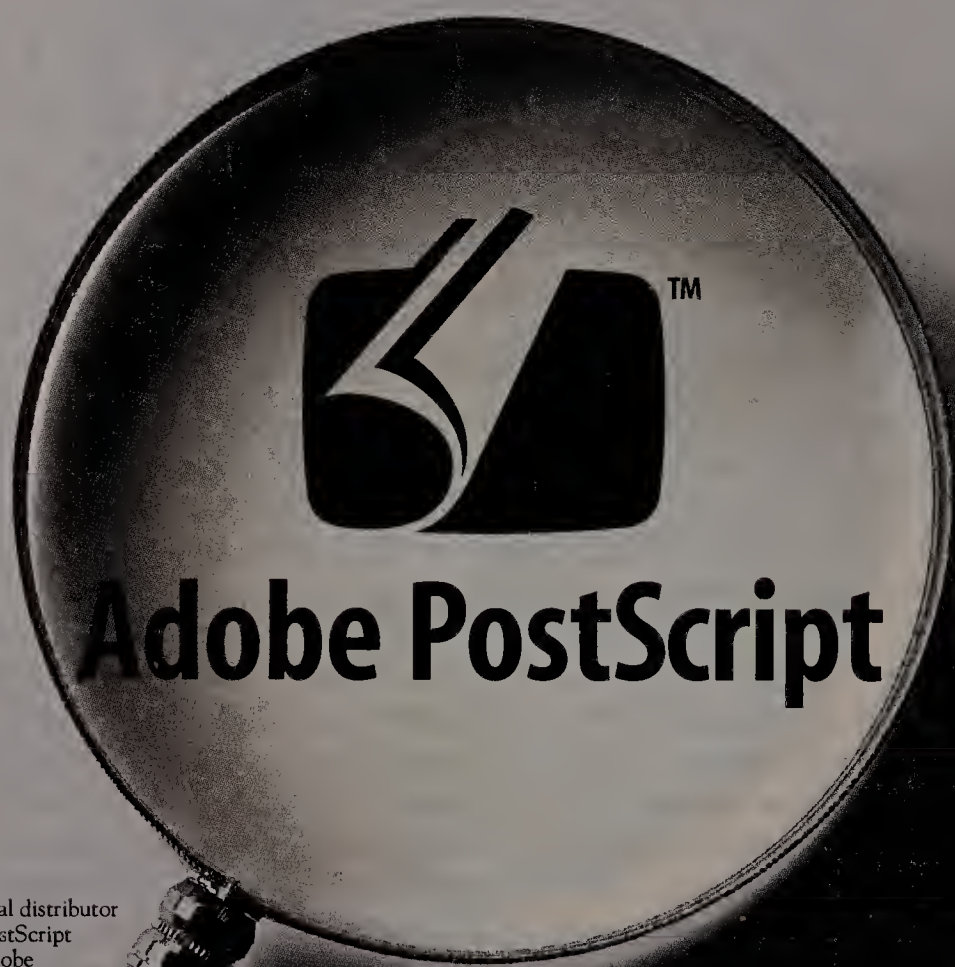

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Prepare to Step Into the MAW of the Future

Microsoft At Work, aka Bill Gates's Plan for World Domination Through Windows, is a scheme for getting Microsoft software on everything in an office that might benefit from having a microprocessor and an operating system. As schemes go, it's a pretty good one, promising to turn our fax machines, copiers, telephone systems, and personal digital whatchamacallits into full citizens on our local area networks.

Early next year—maybe sooner—I expect a Microsoft At Work fax machine to appear on my desk. With this gizmo, I'll be able to scan in a dozen faxes during the day and have them sent while I sleep and the phone rates are lower. Apps will know how to access Microsoft At Work fax hardware and use it as a fax server, connected directly to my PC or across a LAN. Delrina is already working on software to operate Microsoft At Work fax-modems from the desktop, and other vendors have signed up too. What's really cool about this scheme is, Microsoft is adding digital data to the faxes that lets them be routed automatically via E-mail to the recipient's desktop or held in the fax machine until the password is entered.

At Work will allow PCs and telephones to work together in ways easily imaginable—such as dialing from applications through a PBX—but difficult to achieve with existing technology. The phones will benefit from a more graphical user interface as well as the ability to accept information from a network administrator (configuration and dialing directories come immediately to mind).

At Work will mostly just make life more fulfilling for people who can already check "computer literate" on their employment applications. But it will also enable those not so blessed to rise a bit on Maslow's Hierarchy of Happiness. This group will become computer literate and not even know it, thanks to the Windows-style interface Microsoft has planned for At Work devices. The result will be something close to how an automatic teller machine operates. But for folks who sit watching *12:00* blink endlessly on their VCRs (or who think Apple's Newton is really revolutionary), the MAW machines should hit the spot.

Inside At Work

An At Work fax machine will consist of a CPU, a hard drive, a scanner, a network adapter, a laser printing engine, and a modem. The copier will use the same parts except for the modem and maybe the hard drive. The At Work desktop telephone will use a CPU, memory, a telephone interface, and perhaps a network connection, which could just as well be attached to the big switch in the phone closet as to a LAN.

All this convergence between PCs and office machines is going to take a while—most people aren't going to run out and buy new office gear just because Bill Gates says *please.* But unless Microsoft has missed the mark entirely, At Work will be a creeping success and the world will be a better place. Other software vendors had better watch out though, because I can't shake the feeling that somehow Microsoft applications will work better with At Work than anyone else's.

As for me, I'm holding out for a Windows-based electric carving knife so I can stop making a fool of myself at Thanksgiving. I could just press the icon representing how the turkey is supposed to look when I'm done, toss the knife into the air with a flourish, and keep my arms and legs away from the table until perfect slices appear on everyone's plates.

Contributing Editor David Coursey edits P.C. Letter, *a newsletter for industry insiders, and produces the annual Demo conferences, both headquartered in San Mateo, California. He can be reached at MCI Mail, PCLETTER; America Online, DCOURSEY; and CompuServe, 76711,23.*

Looking Ahead

Merger mania: It's going to be a busy winter as new partners work on joint products. Corel is buying Ventura. Expect CorelDraw to become more tightly integrated with the third-place desktop publishing package and Ventura to gain clip art and font technology from Corel. PageMaker and Quark users, however, will hardly notice... More interesting is the Intuit/ChipSoft merger. What I'm expecting is a new release of Quicken that figures your taxes automatically—so you always know how much you owe or get back. TurboTax should become easier to use... More details of Microsoft's Windows 4.0 (Chicago) and future Cairo operating systems should emerge from a developers' conference in early December.... Traveling Software plans a "wireless docking station" for introduction at COMDEX Fall, using inexpensive radio devices to provide access to a desktop PC from a portable machine up to 60 feet away ... And if anyone knows for sure whether there will be a port of Windows NT for the PowerPC, drop me a note. Everyone says they know, but no one seems to.

By David Coursey

The HP 4L isn't bad, but

THE HP 4L

There's only one option on the HP 4L. A memory upgrade from 1MB to 2MB.

The HP 4L is a good laser printer. Just limited.

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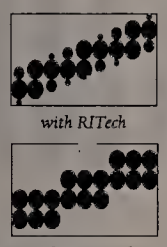
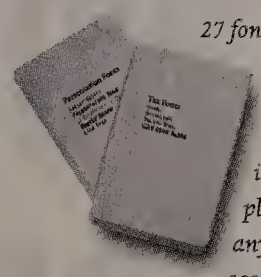
t's no ActionLaser 1500.

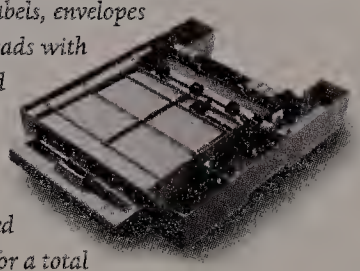


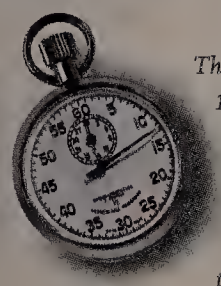
Epson's RITech (Resolution Improvement Technology) increases the ActionLaser's normal 300 dpi print quality to eliminate jagged edges right where you need it: in the curved lines of letters, numbers and images. And Epson's MicroArt printing technology gives you deep, dark blacks and incredibly fine lines.



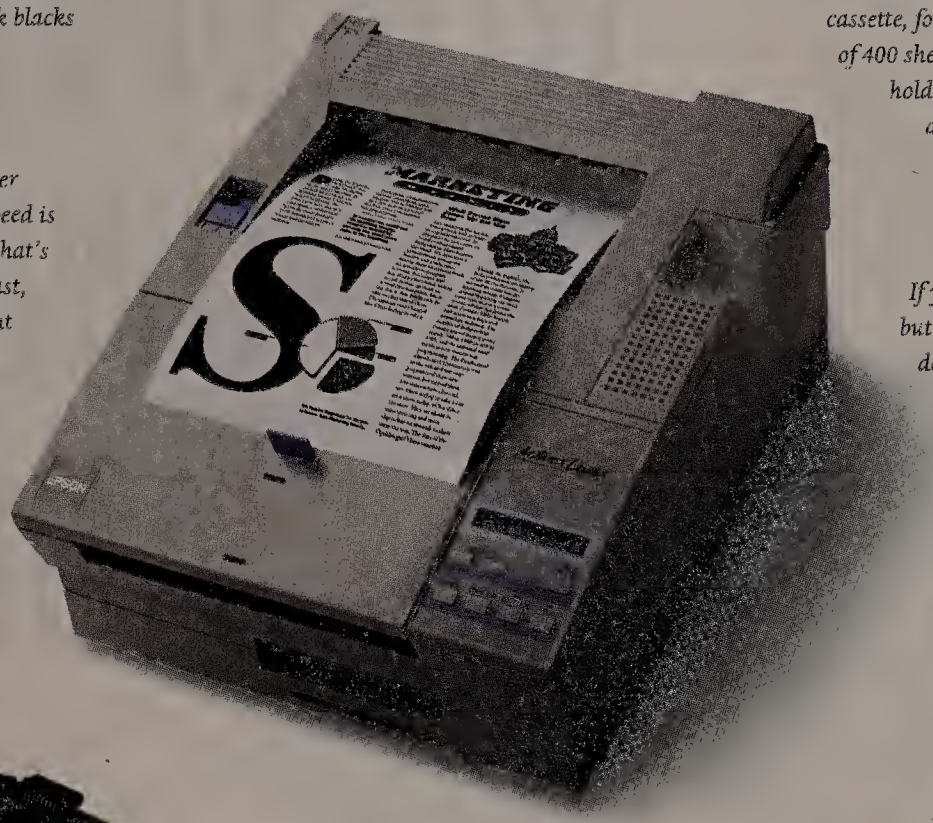
27 fonts (13 scalable) are standard. Should you expand your typographical horizons, unlimited fonts are easy to install via HP-compatible plug-in cartridges, available anywhere. The HP 4L doesn't accept HP's cartridges.

The ActionLaser has 150 sheet paper capacity (letter or legal), and handles stacks of labels, envelopes and overheads with ease. And there's an optional 250 sheet auto-feed cassette, for a total of 400 sheets. The HP 4L holds 100 sheets. Envelopes, labels and overheads are manually fed, one at a time.



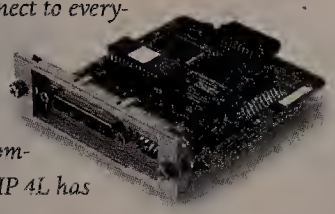


The ActionLaser 1500's top speed is six ppm. That's seriously fast, fifty percent faster than the HP 4L.



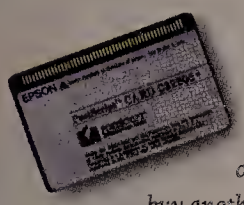
If you have a DOS machine, but decide to get a Macintosh, do you need a new printer? Not with an ActionLaser 1500. Just add our EpsonTalk interface and your Mac plugs right in.

The ActionLaser 1500 comes standard with parallel and serial interfaces that allow two users to share a single printer. Add another interface and a third user can share the same printer. The ActionLaser 1500 can connect to everything from PCs to IBM mini and mainframe computers. The HP 4L has one interface.



THE EPSON ACTIONLASER 1500

It's easy to add more memory. Just pop in inexpensive, industry standard DRAM chips, for a maximum of 5 MB. The HP 4L only goes up to 2 MB.



PCL 5 emulation is standard. The extra power of Adobe PostScript is a simple plug-in option. With HP, you have to buy another printer to get PostScript.

PC Computing Best Buy. (June 1993.) The word is getting around. The Epson ActionLaser 1500 is the best choice in personal lasers.

The ActionLaser 1500 comes with Epson's limited two year warranty. HP offers one year. For help, call the Epson Connection. Quite possibly the best help line in the business. And it's free.

THE EPSON CONNECTION

Don't buy a laser with a limited future. Buy one that is able to expand for the future. Compare, and you'll see why the speedy, inexpensive ActionLaser™ 1500 is the one laser worth owning. For information on the Epson ActionLaser 1500, our ink jet and dot matrix printers, or scanners, call the Epson Connection℠ at **1-800-BUY-EPSON** (800-289-3776).

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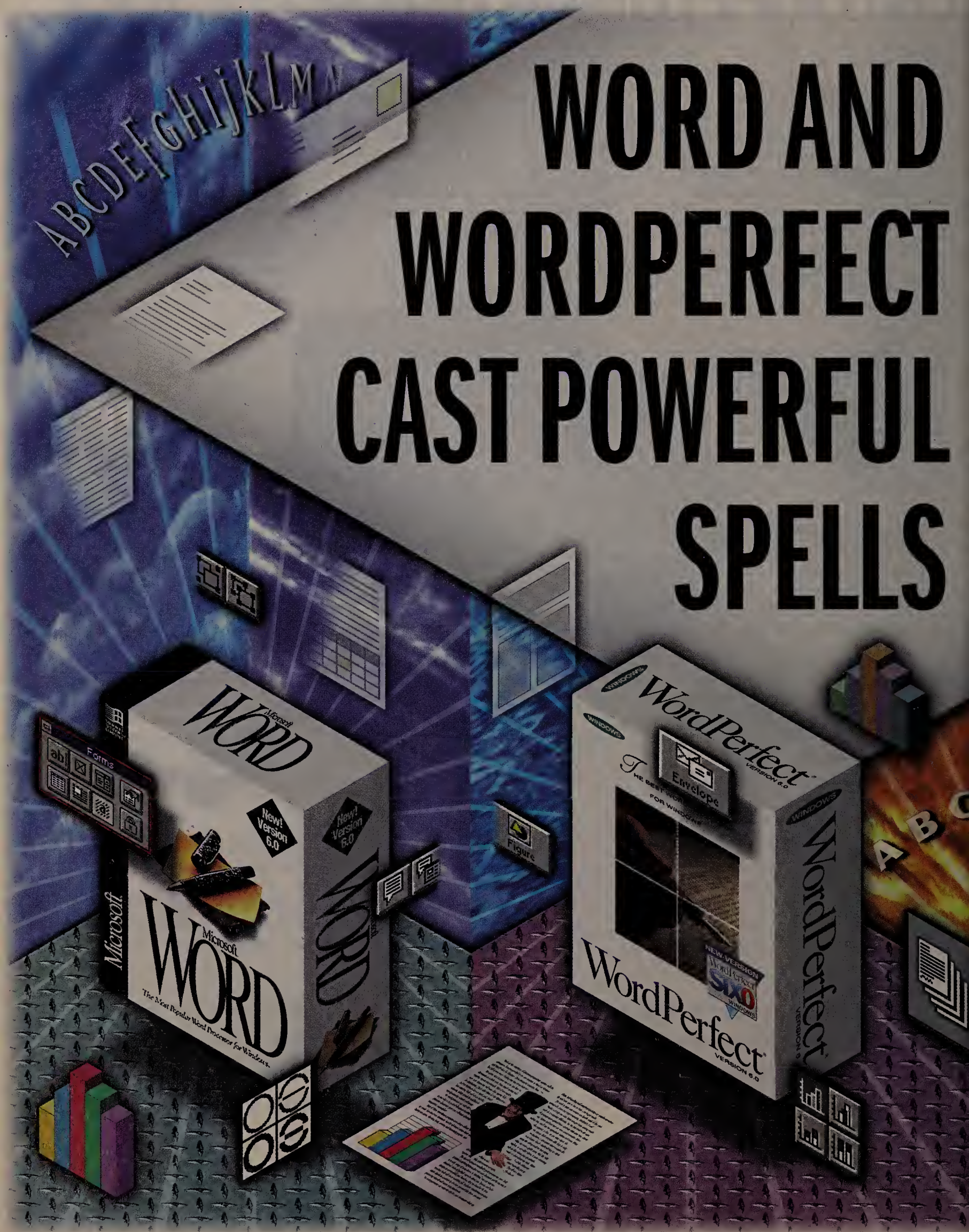
WORD AND WORDPERFECT CAST POWERFUL SPELLS



Edited by Russell Glitman

TEST DRIVE

No matter what business you're in, you have to produce a variety of documents on a daily basis, from simple memos and sales letters to complex reports and manuals. What if you could wave a magic wand over your documents and make them appear fully formatted and ready for distribution? That's what Word 6.0 for Windows and WordPerfect 6.0 for Windows have in mind, and, based on our experiences with the beta versions, both will do an excellent job. In almost simultaneous releases, which should be available by the time you read this article, these two word processing wizards will amaze and astound you.

Much of the complexity of document preparation vanishes with the automation features provided in the new versions of WinWord and WordPerfect for Windows.

No word processor will write the text for your documents—that's up to you—but a big part of document creation is formatting. Producing attractive documents gives you a distinct advantage in an increasingly competitive marketplace.

Both of these powerhouse programs have always offered the tools to create just about any document, but the job hasn't always been easy. Laying out pages, choosing fonts, creating and formatting graphics and charts, and handling mail merges and printing are complex operations. Up until now, you've had to learn a lot to get results.

The tools in these new versions can handle much of that work automatically. From text entry to printing, WinWord 6.0 and WordPerfect 6.0 help you work faster and get better-looking results. Each does it somewhat differently, but the end result is much the same.

Interface Sleight of Hand

Both programs have updated their interfaces with some new, almost magical tools. Button and icon bars are now context-sensitive. When you're editing text, you'll see the appropriate buttons and icons. When you're working with a graphic, a chart, or any other object, the appropriate shortcut tools pop up. Both programs offer help in using these icons and buttons by displaying a description when you place the mouse pointer on the icon or button. Finally, double-clicking an object other than plain text pops up the editing tools for that object.

In either program, when you need a quick menu, click the right mouse button on text, graphics, or any other object. A menu containing the most common commands for that object pops up instantly.

The programs differ in their dialog box style. WinWord uses dialog boxes that look like stacks of file folders for general functions, while WordPerfect uses nested dialog boxes that pop up when you click a button. The WinWord style—clicking OK on a single all-inclusive dialog box—is much faster and simpler.

The days of separate, noneditable print previews are gone. Both WinWord and WordPerfect show you your document and let you edit it in a wide range of zoom levels. In WinWord, you can even see thumbnail views of multiple pages to check your layouts, and make changes in that mode.

Automatic Typing Tricks

You wouldn't think typing could be automated, but Word 6.0 for Windows even helps with this task, using what Microsoft calls IntelliSense technology. AutoText, an extension of the Glossary feature, lets you save blocks of preformatted text or graphical objects, assigning abbreviations to them. When you need a block again, type the abbreviation, then press <F3> or click an icon to pick from a list. Another new feature, AutoCorrect, automatically eliminates most common typing errors. Here's how it works: You store commonly mistyped words with their correct spellings. The next time you mistype, WinWord magically corrects your spelling when you press the <Space>

News Monitor

END OF THE LINE FOR FREE SUPPORT? Calling Microsoft for Windows technical support is now going to cost you.

As of October 1, Windows offers 90 days of toll-call phone support from the date you make the first call. Previously, Microsoft gave Windows owners unlimited support via toll calls. If you're a current user, the grace period is 90 days from your next Windows call.

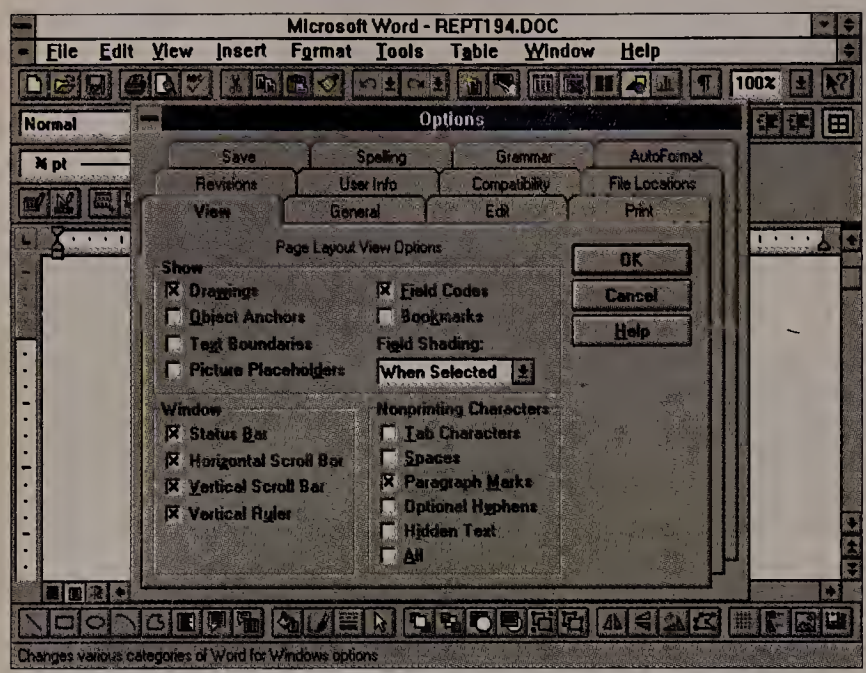
Charging for support has been a growing phenomenon as vendors seek to reduce their costs in the face of declining prices, and Microsoft's move may accelerate the trend, says Mike Melenovsky, director of services research at International Data Corporation. Some companies, such as Lotus Development Corporation, are already charging customers, and Melenovsky says that by next fall, free software support may vanish.

After 90 days, Windows customers will now pay $2 per minute on a 900 line at a maximum charge of $25 per call, or buy a phone support contract. The support contracts vary by product and level of support. For example, for Windows and DOS questions, a one-year, unlimited 800-line contract costs $195 and provides 24-hour, 7-day access. Apps such as Word and Excel still include unlimited free support via a toll call. You can get prepared answers to common questions about Windows, DOS, and apps at no charge via fax, bulletin boards, and an 800 number.

ONE AND ONE MAKE ONE: The recent flurry of software mergers and acquisi-

(continued on page 73)

Top of the News



WinWord uses a file folder metaphor in its all-inclusive dialog boxes. Here, the Options dialog lets you set all program options in one place.

WordPerfect 6.0 groups icons together for its Preference dialog box. Unlike WinWord, it uses separate dialogs for each setup function.

Continued from page 71

bar after you type a word. You can store long phrases in the AutoCorrect list, for even faster insertion, but to avoid conflicts they must be linked to an abbreviation that is not a word.

WordPerfect 6.0 doesn't offer you the AutoCorrect feature, but it does add a new Abbreviation feature that's much like WinWord's AutoText. You store abbreviations for blocks of text or graphical objects, then type and select the abbreviation and press <Ctrl>-A. It's not as easy as the AutoText system, but it works well.

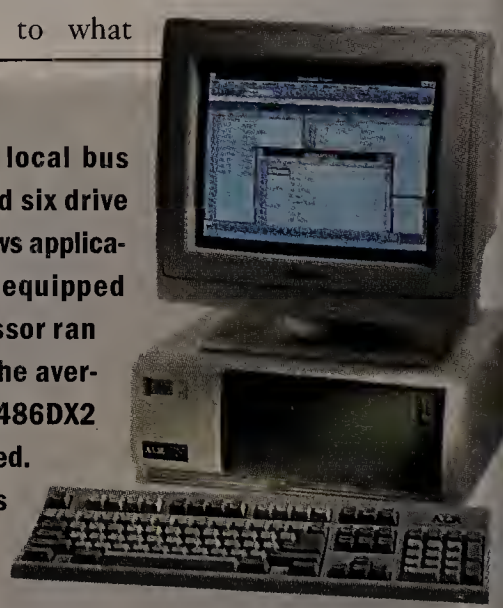
For further text entry automation, WordPerfect relies on its macro facility. You can record a macro containing any text you wish, then assign it to a keystroke or button for instant availability. In both programs, you can store as much boilerplate text as you like in template documents.

Editing is always a chore, but these two programs help you out in that area as well. Both offer drag-and-drop tools for moving and copying blocks of text. Search-and-replace tools in both programs are exceptionally powerful and include searches for formatting. WinWord even includes "fuzzy" search tools that hunt for text that sounds similar to what

ALR's Bargain Pentium PCs:

A Pentium PC for under $2500? Well, almost. Advanced Logic Research says its Pentium-based Evolution V PCs are priced "from just $2495"—but you'll have to pay extra for the hard drive, monitor, and a few other key features. More realistic is the $3893 price tag for ALR's Evolution V Model 170DWN, which includes a 14-inch color monitor, a 170MB hard drive, DOS 6.0, Windows 3.1, and a mouse.

Nevertheless, ALR's Evolution V PCs are among the most competitively priced Pentium systems we've seen so far. Each features a 64-bit data path between the processor and the 256K secondary cache and between the cache and main memory. Other standard features include 32-bit VESA local bus architecture, six ISA slots, and six drive bays. Running *PC World*'s Windows application test suite, an Evolution V equipped with a 60-MHz Pentium processor ran about 18 percent faster than the average of the 25 quickest 66-MHz 486DX2 machines that we have ever tested.



While the Evolution V series is designed for desktop power junkies, the pricier V-Q line is for corporate customers in search of the ultimate file server. Featuring ALR's QuadFlex 128 architecture, the Evolution V-Q has a 128-bit data path between cache and memory that speeds data transfer. Other key features include a full-size tower case, 13 drive bays, ten EISA slots (three double as VL bus slots), and a 415-watt power supply. Prices start at around $4500 for the V-Q line. In addition to the ALR Evolution systems, Pentium upgrade boards are available for users of ALR ProVEISAs: The 60-MHz board has a list price of $2395, and the 66-MHz board is $2695. Advanced Logic Research, 800/444-4257, 714/581-6770. Reader service no. 681

ALR's Penny-Pinching Pentium Performs

	Excel 4.0	Freelance for Windows 1.0	Word for Windows 2.0	Paradox 3.5 in DOS window
60-MHz ALR Evolution V	66	88	83	85
Best of 25 486DX2-66 PCs	75	111	98	113

Time in seconds. Data based on tests by the PC World Test Center. All rights reserved.

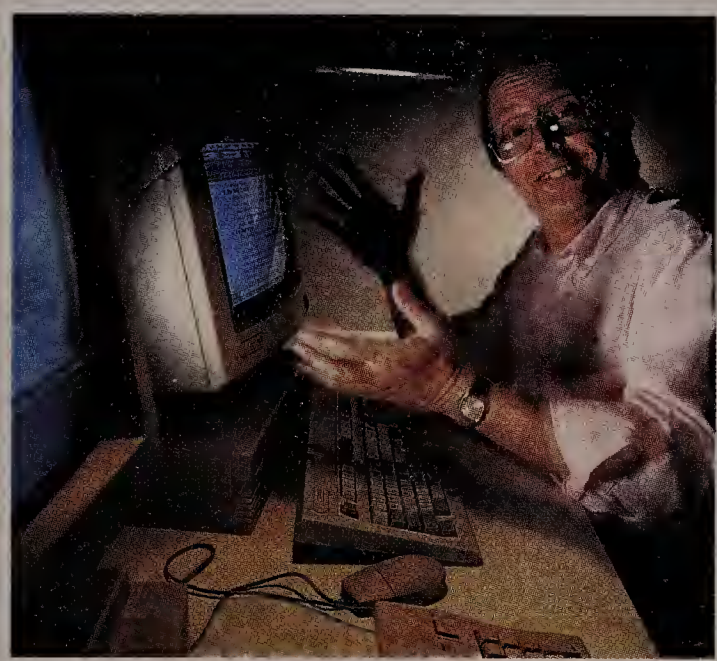
you want. Word for Windows' Undo command offers 100 levels selectable from a drop-down list.

Text selection also gets a boost. Since in most formatting chores you select blocks of text, both programs offer shortcuts for choosing common text elements such as words, sentences, and paragraphs. In both programs the number of clicks you make determines which element you select.

Formatting Trickery

Typing and editing your text is just the first step. Next you'll need to do some formatting. Here's where the two programs part ways. Both have powerful new automatic formatting tools, but they work differently.

Word for Windows has offered automated templates ever since version 2.0. These can include macro buttons and automated fields to guide a user through creation of a preformatted document. Now the program has an AutoFormat feature. You type in unformatted text, then select the AutoFormat command in the Format menu. WinWord scans your document, then lets you select a template in a Style Gallery, complete with preview functions. Finally, the program formats your document automatically to match the layout, including fonts and page layout. The professionally designed templates produce good-looking documents almost instantly. WinWord's improved automatic formatting features impressed beta tester John Wolley, a technical writer for the Indus Group in San Francisco. Wolley also found that the new dialog boxes make it "easier to copy a template's attributes to another template."



FORMATTING, DRAWING, and DTP enhancements are what impressed WinWord beta tester John Wolley.

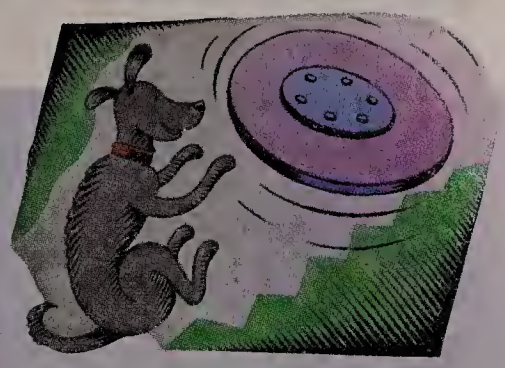
WordPerfect doesn't have an automatic formatter, but its templates are extremely powerful. You select a preformatted template for a new document, then simply enter the text. In some cases dialog boxes asking for information will appear in your document. The program includes dozens of templates, and you can create your own.

To further automate document creation, try Word for Windows' Wizards. Like WordPerfect's templates, they guide you through the process, but they do even more. The Letter Wizard, for example, includes a large set of prewritten business and personal letters for bill collecting and even for writing to Mom and Dad.

The key to these new versions' innovations is not the templates and other tools that come with the programs, helpful as they may be. What is really useful is the way you can customize these powerful tools to create templates for your business or department. Then anyone on your staff can create perfectly formatted documents in a few simple steps. The advantages for corporatewide document standards are clear.

Microsoft Word 6.0 for Windows

WINDOWS About as close to automated word processing as you can get until voice recognition makes its entry.
Key Features: AutoText types for you • AutoCorrect eliminates typing errors • AutoFormat • Wizards • Create call-outs and draw on the page
Pricing: $495; update from previous versions $129, competitive upgrade $149
Availability: November
Microsoft Corp., 800/426-9400, 206/882-8080
Reader service no. 691



News Monitor

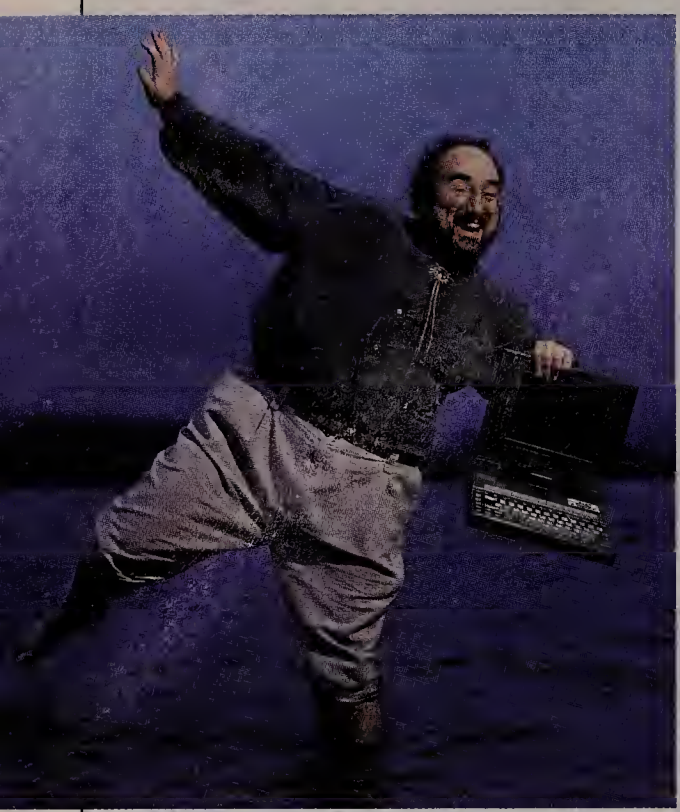
(continued from page 71)

tions could mean better products but fewer choices for buyers, says InfoCorp analyst Chris LeTocq in Santa Clara, California. Recent mergers include Intuit's acquisition of financial software rival ChipSoft; Symantec's purchase of Fifth Generation Systems; and a three-way merger between WordStar, Spinnaker, and SoftKey. In addition, Corel acquired Xerox's Ventura Software subsidiary, and Rupert Murdoch's News Corporation bought Delphi Internet Services. The impact on users? "Better products from the companies doing the acquiring," LeTocq says. Intuit's future products will likely include ChipSoft's tax software technology, LeTocq predicts, while Symantec's product line might add Fifth Generation's FastBack backup software.

JOIN A USER GROUP, GET CHEAP SOFTWARE: Vendors continue to offer special bargains to user group members, including discounts on hardware and software products. Recent one-time deals included $79 for WordPerfect 6.0 for DOS. Why the bargains? User group members influence buying decisions at work and home, vendors say. At a recent meeting of major software companies at Microsoft in Redmond, Washington, vendors expressed concerns about a price war of user group discounts but didn't take action to end these special offers.

PDAs PROLIFERATE: Competition is heating up to define and grab a share of the personal digital assistant market. Two recent announcements indi-

(continued on page 75)



WORDPERFECT IS TRANSFORMED, says author and beta tester Daniel Will-Harris.

Continued from page 73

Style sheets are an important formatting aid, and they've been improved in both programs. WinWord, long a style magician, has always treated styles as paragraph modifiers, incorporating alignment, font characteristics, line spacing, justification, and other elements in its style definitions. In this version, styles can also apply just to character attributes if you wish.

Styles in WordPerfect's earlier versions were unappealing, but that has changed. You can quickly format any document with styles for text or paragraphs. Better yet, you can use WordPerfect styles for graphics box layout, borders, and lines. You can edit any style, or create styles from preformatted text, just as in WinWord.

WordPerfect's styles are even more amazing than WinWord's, since they can also contain page formatting, graphics, and text. "A lot of users had problems with styles and graphics disappearing" in version 5.1, said author and beta tester Daniel Will-Harris. Not so in 6.0. Its handling of fonts, paragraph styles, and text effects puts WordPerfect back into the major league of word processors.

Both programs offer fast format painting as well. Select a block of formatted text, then click an icon. When you drag over other text with the new paintbrush or paint roller icon, you'll automatically apply that style to the new text. There's no faster way to format a document.

Graphics Wizardry

These days a document's not finished until it has at least one graphic, whether it's just a company logo or a combination of tables, charts, borders, and more. Both of these document magicians do it all with ease.

Word 6.0 for Windows adds new graphics tricks. You can now draw directly on the page, using a palette of drawing tools to create lines, curves, boxes, and circles anywhere in your document. Call-outs are another new feature. Similar to cartoon balloons, call-outs are text boxes from which a line points at something you want to emphasize. To create one, click an icon, then click on the object to be emphasized and drag the balloon and line to a blank spot.

While WordPerfect lets you draw only lines on the page, it has added some graphics features. Pages can have automatic bor-

WordPerfect 6.0 for Windows

WINDOWS You get word processing *your* way, with a well-stocked tool room to customize your workplace.

Key Features: Context-sensitive buttons • Pop-up editing tools and help line • Watermarks • Spreadsheetlike tables • Customizable keyboard and interface

Pricing: $495; upgrade from earlier versions $129, competitive upgrade $149

Availability: Immediate

WordPerfect Corp., 800/451-5151, 801/225-5000

Reader service no. 692

First Glimpse of Microsoft At Work:

While not a revolutionary improvement over its predecessor, Windows for Workgroups 3.11 adds plenty of new features that are certain to please end users and LAN administrators alike. This new version of Microsoft's peer-to-peer network operating environment adds built-in fax capabilities, better security, improved integration with existing corporate networks, and an optional package that lets DOS-only computers join a Windows for Workgroups network.

The new fax component of version 3.11 is the first implementation of Microsoft At Work Architecture, the company's ambitious plan to allow PCs to communicate with the next generation of copiers, fax machines, printers, and other office equipment. While Microsoft At Work doesn't yet offer this level of office integration, the fax module does provide a few helpful features. For instance, you can send a file (such as a document or spreadsheet) via modem to another Windows for Workgroups 3.11 user without having to load a separate communications program.

Version 3.11 also offers improved network connectivity with popular LAN operating systems such as Novell NetWare, Banyan's VINES, UNIX, and Windows NT. New support for NetBEUI, IPX, TCP/IP, and other network protocols promises better integration with these OS's for file and printer sharing and other tasks. Improved security features give the LAN administrator more control, including the ability to disable file sharing for certain users.

Windows for Workgroups isn't just for Windows anymore. The new Workgroup add-on for MS-DOS allows DOS users to share files and printers and exchange E-mail with users of Windows for Workgroups and Windows NT as well as with other add-on–equipped DOS users. Microsoft officials expect the Workgroup add-on to retail for about $80; Windows for Workgroups 3.11 will list for around $250, with upgrades selling for about $100. Microsoft, 206/882-8080. Reader service no. 684

ders, in any of 28 included styles. They can also each have up to two Watermarks, faded-out graphics that underlie your text. Text can wrap around an image's outline, rather than just around the box holding the image. Finally, WordPerfect offers a more complete set of processing tools for imported images than WinWord does.

Both programs let you manipulate text as a graphic element, including wrapping it around curves and adding shadows, fills, and other effects. Both use normal Windows fonts to create the effects.

The programs also offer spreadsheetlike tables. WordPerfect's tables have an extensive list of formulas for performing calculations. WinWord's formula list is shorter, but it outdoes WordPerfect when it's time to format the table. You can select any of the included formatting styles and let WinWord add border lines, colors, and shading in one step; WordPerfect requires you to step through multiple dialog boxes. Turning table data into colorful business charts is a simple hat trick for both programs. You just select the data and click the charting icon. These charting modules are as powerful as those in many business graphics programs and include 3-D views, a wide variety of chart types, and automatic legend and title insertion.

Automation and Customization Sorcery

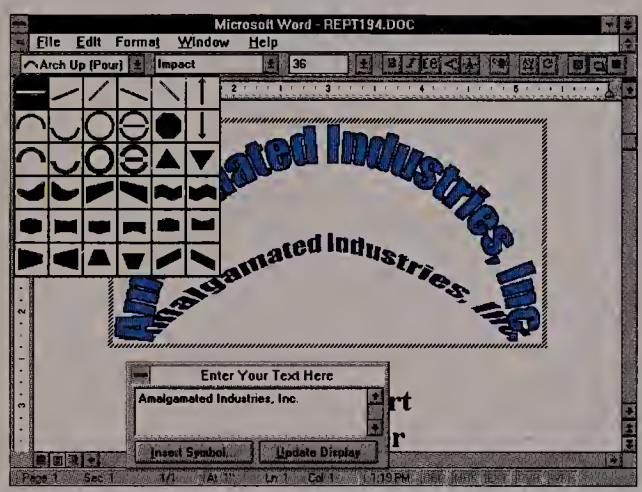
These programs' automation and customization tools have been powerful since day one, but the new versions have added even more ways for you to make those tools work *your* way.

Microsoft didn't squeeze Visual Basic for Applications, the new macro language it's planning for all its programs, into this version, but it did add new macro tools. You can now begin macro recording just by double-clicking a button on the status bar. WinWord now lets you assign your new macro to a keystroke, menu, or icon before you record it. While editing more complex macros, you can paste in examples from the online WordBasic help feature.

WinWord's keyboard and menus are now fully customizable. Fields, used in automated templates and mail merges, include a macro field and are easier to use. For add-on developers, there's OLE 2.0 support, an API for C language, and MAPI programmability for E-mail. You can alter tool bars ad infinitum, and there's a tool bar icon editor.

WordPerfect didn't stint on automation improvements, either. You can customize keyboard layouts, icon bars, and menus to suit any need. The new macro language has more than 800 new commands, giving you access to every function in the program. As with version 5.2, you can create and edit macros as you would any document, but this version also lets you record commands while editing a macro—a unique feature. Full macro language for the application documentation is available online.

Fully automated document templates can hold custom menus, icon and button bars, and styles; Coaches, written in WordPerfect's macro language, give corporate users and third-party add-on publishers another way to add their own automation tools.



WinWord 6.0 offers new tools, including shadowing and the ability to wrap text around curves.

The Text art tool lets you manipulate text as a graphical element in WordPerfect 6.0.

News Monitor

(continued from page 73)

cate a conceptual shift away from the Apple Newton MessagePad. VLSI Technology unveiled the Polar Chip Set, developed in association with Intel, Microsoft, and Compaq for inclusion in PDAs from Compaq and possibly other vendors. Combining the Polar technology with Microsoft's At Work operating system software could lead to DOS-compatible products that are an extension of the desktop, rather than the isolated tools these products are now. Sharp, meanwhile, announced the PT9000 PDA to be positioned between subnotebooks and the Newton MessagePad, which Sharp sells as the Expert Pad. The PT9000 Personal Information Assistant will have a large LCD screen, an optional detachable keyboard, two PCMCIA slots, and built-in communications capabilities.

CHIP WARS ESCALATE: Cyrix Corporation aims to raise the price-performance point with its own versions of the 486DX and 486DX2 microprocessors. The chips will be available in models compatible with DX-33, DX-40, DX2-40, DX-50, and DX2-50 chips. All feature Cyrix's advanced power management features and a built-in math coprocessor. A 3.3-volt 33-MHz chip designed for notebooks is scheduled to join the lineup in early 1994, with a 66-MHz 486DX2 to follow. Approximate pricing is 20 percent below comparable Intel products.

Contributors: Joe Abernathy, Jeff Bertolucci, and Laurianne McLaughlin

A Word Processing Checklist

● Yes
○ No
● New feature

Specifications	Word 6.0 for Windows	WordPerfect 6.0 for Windows	Ami Pro 3.01
Disk space requirement (full installation)	22B	33MB	13MB
Minimum installation	5MB	10.3MB	4MB
Interface			
Right-click context-sensitive menus	●	●	○
Floating icon bar	●	●	●
Context-sensitive icon bars	●	●	○
Automatic descriptions for icons	●	●	○
Edit in all views	●	●	●
Thumbnail print preview	●	○	○
Customize keyboard	●	●	○
Customize menus	●	●	●[1]
Interactive status bar	●	●	●
Previews in dialog boxes	●	●	●
Multifunction dialog boxes	●	●	●
Editing and formatting			
Format painting	●	●	●
Personal and shared style sheets	●	●	○
Character styles	●	●	●
Paragraph styles	●	●	●
Graphics styles	○	●	○
Automatic spelling correction	●	○	○
Automatic formatting	●	○	○
Display formatting codes	●	●	○
Variable-width columns	●	●	●

Graphics	Word 6.0 for Windows	WordPerfect 6.0 for Windows	Ami Pro 3.01
Charting, drawing, and equation editors	●	●	●
Draw directly on page	●	○[2]	○
Manipulate text as graphics	●	●	○
Number of included border styles	11	28	12
Macros and automation			
Record macro during editing	○	●	○
Automated templates	●	●	○
Macro buttons in document	●	●	○
Work-group features			
Individually identified annotations	●	●	○
E-mail support	●	●	●
Compare documents down to word level	●	●	●
Individual configurations for LAN users	●	●	○
Mail merge			
Built-in data entry forms	●	●	●
Guided mail merge process	●	●	●
Include envelopes in merge	●	●	○
Pick fields from list	●	●	●
Direct use of database files	●	●	●
Help and learning			
Help buttons in dialog boxes	●	●	●
Programmable Coaches or Wizards	●	●	○

[1] Available through included macro. [2] Lines only.

Continued from page 75

Expect to see automated training aids soon.

Finally, WordPerfect's hypertext tools let you create dynamic links inside documents, including links to tables of contents for self-browsing text. As in WinWord, you can add sound clips and video clips.

Printing and Mail Merge Legerdemain

Both WinWord and WordPerfect now offer background printing, first available in Ami Pro. You also get batch printing, odd and even page printing, and the capability to mix portrait and landscape pages. And both programs print PostNet bar codes on envelopes and labels, as well as ZIP+4 codes.

WordPerfect 6.0 supports all the printer drivers available in its previous versions, as well as Windows printer drivers. You also receive TrueType fonts for all 1600-plus WordPerfect special characters.

WinWord can now print end notes and footnotes in the same document and access more than the 255 fonts allowed in the previous version. The product kerns automatically and manages gray-scale and color printing much better than earlier versions.

Mail merges in both programs are much easier, with dialog boxes to guide you. Both now work with standard database file formats, offer data entry forms for mailing-list management, and can include envelopes and labels in the merge. Special mail merge tool bars speed the task, and there's support for all standard envelope and label formats.

Long-Document and Work-Group Witchery

Outliners in both programs make short work of long-document organization, and both products now include master-document features, once the sole purview of WordPerfect. Table of contents and index generation are improved in both programs.

WinWord adds an automated system for formatting tables of contents in any of several styles and now can match WordPerfect's tables of figures. Index entry marking uses an improved dialog box and includes cross-referencing links. Document cross-referencing in WinWord no longer requires manual insertion of field codes.

WordPerfect 6.0 lets you collapse and expand master documents selectively, rather than globally, to work with just the subdocuments you want. The program also adds a QuickMark bookmark for instant jumps to a single location in the document. Finally, special context-sensitive tool bars pop up when you're working with long-document tools such as tables of contents, indexes, and cross-references.

When you deal with long documents and work groups, file management is important. While WordPerfect dropped its stand-alone file manager in this version, most of the manager's functions are embedded in the program. Both programs have good file search capabilities, although WordPerfect's QuickFinder feature includes indexing for

BUY AN OKIDATA PRINTER TODAY, AND YOUR BUSINESS WILL TAKE OFF.

Introducing The Okidata FlightPlan Offer. Buy An Okidata Printer To Boost Your Business And Until December 31, Get A United Airlines Discount Up To $100.

Not only have Okidata printers rewritten the book on outstanding output and reliability; between now and December 31, 1993 Okidata and United Airlines are teaming up to help you and your business go farther. Here's how.

When you purchase an Okidata 24-Pin Dot Matrix printer or LED Page Printer, you will receive a United Airlines travel certificate. If that's not enough, Okidata now features the brand-new OL400e. It's the perfect personal printer for individual PC users. The OL400e offers fast LED output, compact size, an unbeatable 5-year printhead warranty and a surprisingly affordable price.

DISCOUNT CERTIFICATE AMOUNT	*$25*	*$50*	*$100*
Printer Model	ML 380	ML 590, ML 591, OL400e	ML 395, ML 395C, OL810, OL830 Plus, OL850
Certificate Usage	Valid for a ticket of $200+	Valid for a ticket of $300+	$50 each on two tickets of $300+
Discount Travel Certificate is assignable; Saturday night stay not required; no blackout dates apply.			

Depending upon the printer you buy, you'll earn a discount of $25-$100 on United Airlines (see chart at right). Just get a claim form from your nearest Okidata dealer (for the Okidata dealer nearest you, call 1-800-OKI-TEAM, EXT. 322). Full Okidata FlightPlan details are on the claim form. Make your flight plan right now, and prepare for your business to take off.

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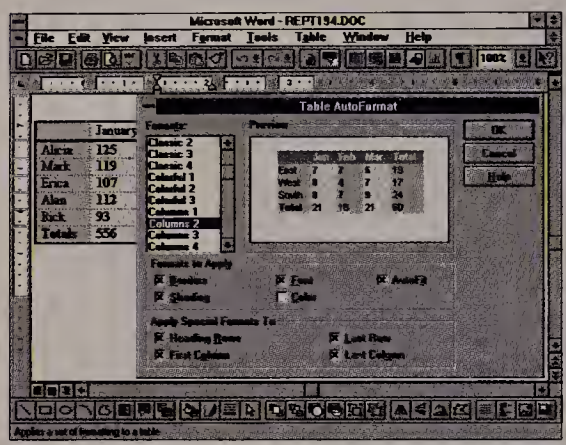
Circle 199 on reader service card

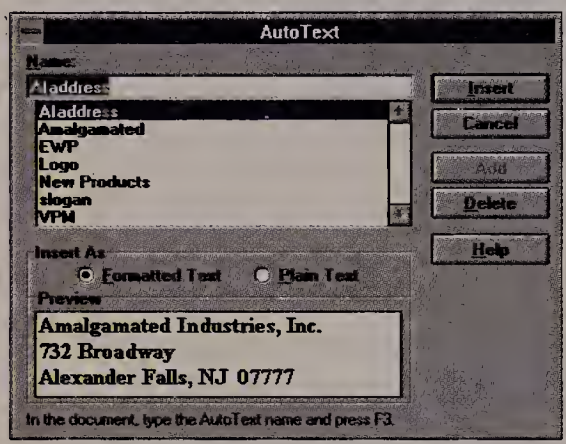
Continued from page 76

documents, which means faster searches when you're looking for text within files.

Work groups get E-mail support in both programs, plus excellent revision-marking tools. Comments and annotations in both programs can include details such as names, initials, and date and time information to aid in the group editing process. Both now offer document comparison tools down to the word level, and document summaries help track revisions.

WinWord helps make the network administrator's job easier by allowing preprogrammed batch installations on workstations. WordPerfect maintains separate setup and style directories for each user, allowing maximum flexibility, while preserving centralized setup files for network stability.





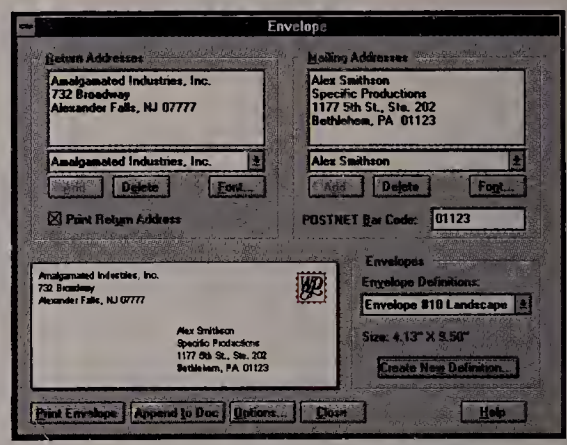
Word for Windows strives to automate word processing with its new AutoFormat feature, above, and the AutoText feature, below.

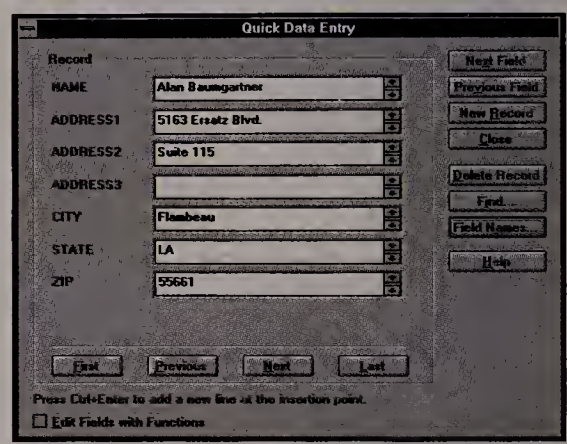
It's expected that these programs will offer a wide variety of import and export filters for foreign file formats, but they weren't included in the beta software we evaluated. New and improved filters are approaching a level of sophistication where it doesn't matter much which program created a file.

Microsoft is likely to take the lead in interoperability by incorporating OLE 2.0 in WinWord and its other new products. According to Microsoft officials, when you embed an Excel 5.0 spreadsheet, say, then work on it inside your WinWord document, OLE 2.0 will display the Excel menus and other interface tools *inside* your document. We could see this at work even in WinWord's charting module; its menus simply replace WinWord's when you work on a chart. WordPerfect 6.0 is still using OLE 1.0 technology, although you can expect an update in an interim release, according to WordPerfect insiders.

A Magician's Grab Bag

There's much more in both of these programs than we can list here. WinWord 6.0 has more than 170 new features and enhancements. WordPerfect added or enhanced even more items. Both programs promise to bring a lot of excitement to the word processing world. At this stage it's impossible to tell which program's the overall winner, but one winner is certain: the word processing user. *PC World* will subject





Mailings are made easy with WordPerfect's Envelope dialog box, top, and interactive data entry form, bottom.

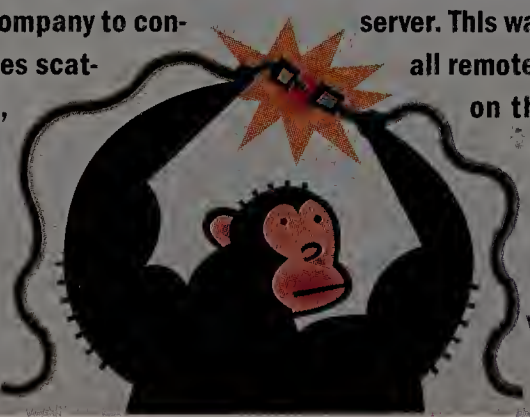
these new programs to performance testing and intense scrutiny in an upcoming roundup. If you can't wait, though, either program should make an excellent upgrade.

The conceptual differences between the two may help you make a decision. Word 6.0 for Windows offers more built-in automation, with its AutoText and AutoFormat features and powerful Wizards. WordPerfect 6.0, on the other hand, relies more on users to create the automation features they need, but it offers more options, albeit with a slightly more complex interface.

—George Campbell

Novell's NetWare Connect:

With the release of its latest client/server package, the 900-pound gorilla of networking companies is getting serious about integrating telecommuters into the office LAN. Novell's NetWare Connect is a scalable communications server built on NetWare that allows a company to consolidate and share communications resources scattered around the office LAN, such as modems, ISDN gateways, and X.25 gateways. As usual, Novell supports all major platforms, including Windows, DOS, OS/2, and Macintosh. This successor to the company's NetWare Asynchronous Communications Services (NACS) allows 2 to 64 connections on a single server, making it ideal for the small/home office or medium-size business.



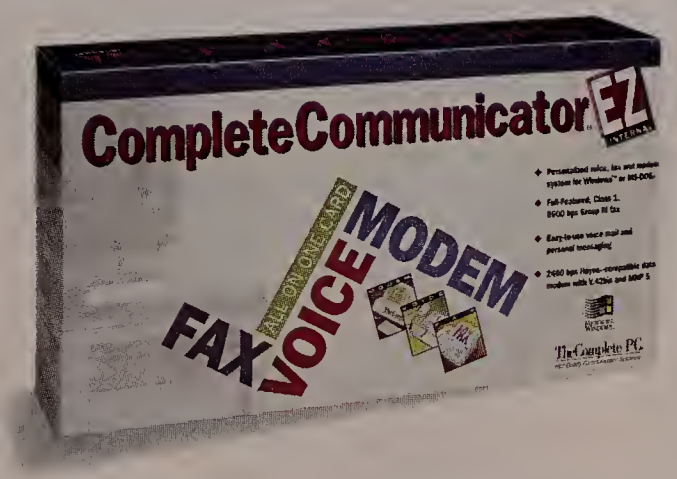
Novell made network security a key design issue. While many workstations on most networks have direct connections to the outside world, NetWare Connect forces all traffic through the NetWare server. This way, not only can a network administrator require all remote callers to enter a user ID and password to get on the network, he or she can set up restricted access for selected users, establish dial-back security, and keep a log of all incoming and outgoing calls. Pricing ranges from $595 for the two-port version to $5995 for the 32-port version. Novell, 800/638-9273, 801/429-7000. Reader service no. 694

Choosing the Best Modem is EZ!

Easy to Buy. The Complete Communicator EZ gives you data, fax and voice mail communications for the price most others charge without voice capability. For under $100, you'll get everything you need to be up and running fast — including the industry's best fax, data and voice software.

Easy to Install. The internal version is easy to install because the fax, data and voice capabilities are all on one card. Or just plug the external unit into your serial port. The simple software installation will get you up and running in less than 10 minutes.

Easy to Use. We've made the software for Windows and MS-DOS the same for our modem, so you won't have to learn two different programs. You can fax directly from either DOS or Windows applications. Plus, faxes and voice messages are received and sent in the background — so you can work uninterrupted.



Easy to Choose. With features like remote message and fax retrieval, personalized fax coversheets, 999 password-protected mailboxes and beeper notification, the choice is clear. Complete Communicator EZ takes care of all your communications needs for less than the cost of a standard fax/data modem. So whether you're in the office or on the road, Complete Communicator EZ keeps you in touch with the rest of the world.

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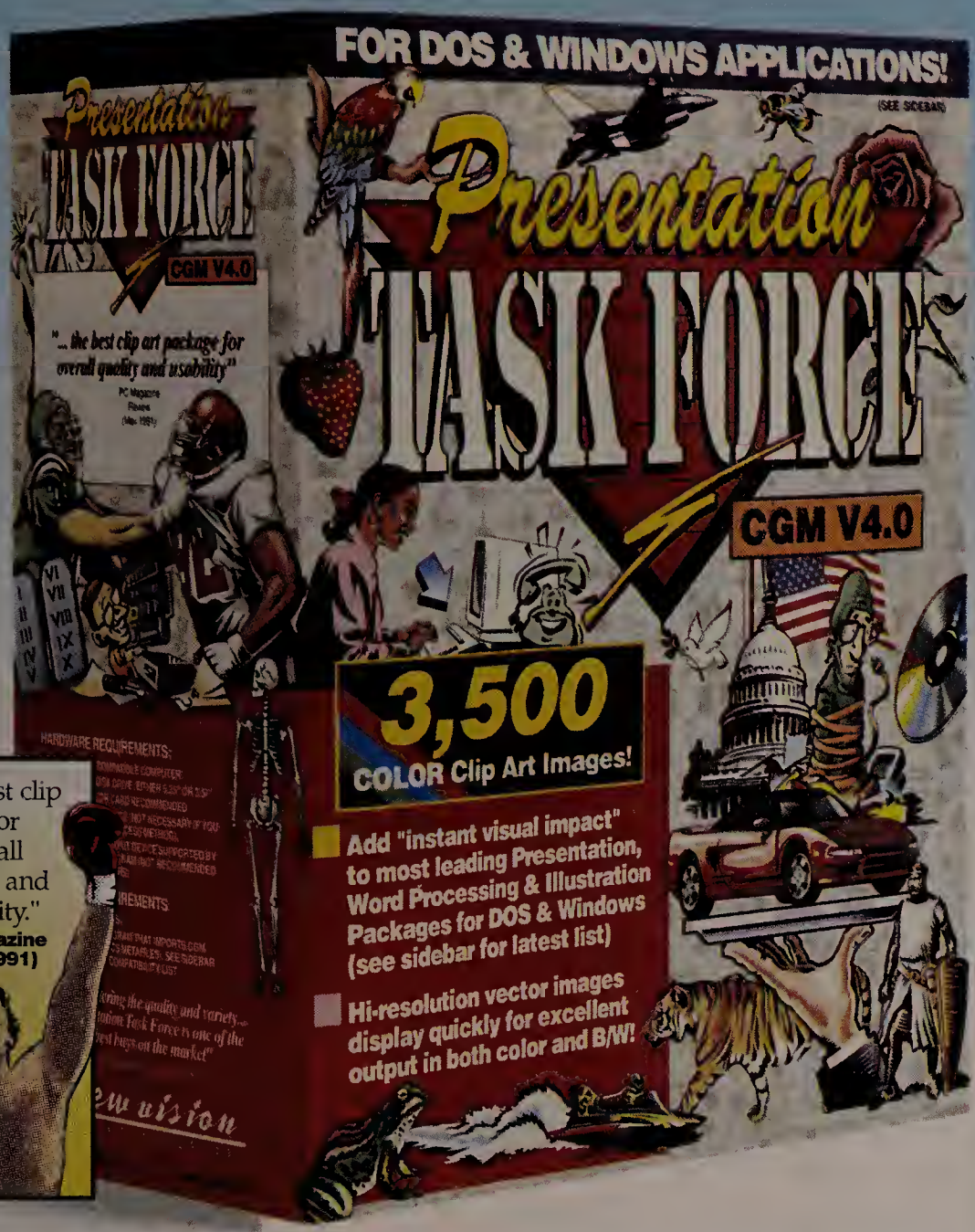

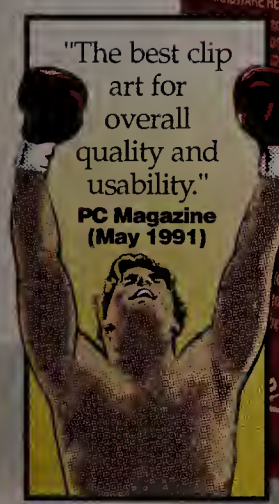

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PC Computing (May 1992)

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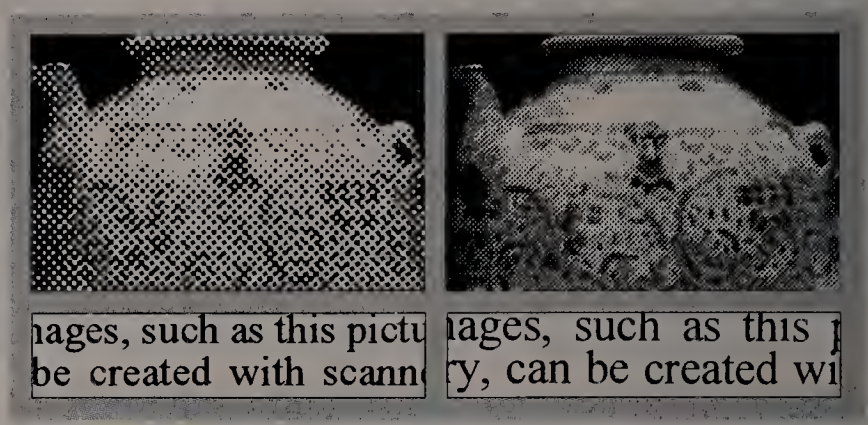
HP Offers 600-dpi Laser for Less Than $1000

TEST DRIVE ▶ High-resolution 600-dpi printing just became affordable. Hewlett-Packard's LaserJet 4P and 4MP, a PostScript model, deliver 600-dpi resolution at previously unheard-of street prices—$925 and $1300, respectively.

HP broke the $1000 price point for 600-dpi printing by sacrificing speed: The 4P is powered by a new 4-ppm Canon engine. (Until now, to get 600 dpi you had to pay for an 8-ppm engine.) Nonetheless, these printers are compelling additions to the HP line. They offer more features than the LaserJet 4L (a small-footprint, energy-efficient, 4-ppm, 300-dpi model with a $625 street price), and they offer a lower price than the LaserJet 4, an 8-ppm, 600-dpi unit with a $1361 street price.

Even with prices this low, 600-dpi printing isn't for everyone or for every application. When printing standard text documents, we didn't discern any difference between output from the 4P we tested and from a 300-dpi 4L. But with graphics, the differences were significant. The 4P printed much cleaner pie charts and shaded bar graphs and produced fewer jaggies in large fonts.

A page printed from Ventura Publisher showed dramatic improvements in line art, small scanned images, and shaded boxes. A 1-inch-square scanned photo looked much crisper—almost photo quality. Curiously, when we printed a full-page scanned image from Ventura, we got equally poor results from both the 4L and the 4P. Neither we nor HP could solve this problem at press time; our lab thought it might be a driver problem, while HP thought an application was at fault.



THE PROOF IS IN THE PRINTING: The LaserJet 4P excelled in printing sharp, clear, almost photographic-quality images (right), but there was little difference between its text output and the 4L's (left).

Tiny Footprint

The LaserJet 4P borrows other features from the less expensive LaserJet 4L and the more expensive LaserJet 4. Like the 4L, the 4P saves room on your desktop with its small (14.7-by-15.4-by-6.8-inch) footprint. Also like the 4L, the 4P offers "green computing" features. It exceeds the EPA's Energy Star Computers program requirements, powering all the way down to 10 watts.

The 4P also uses the same memory-doubling compression scheme as the 4L. So while most 600-dpi printers require 4MB to 6MB of memory, the 4P uses compression with 2MB to simulate 4MB. (Memory is expandable to 26MB.)

Like the costlier LaserJet 4, the 4P sports both a parallel and a serial port. In addition, more than one port can be active at a time. The 4P and the 4 both use a 16-MHz 80960 Intel RISC processor. As for fonts, the 4P, like the 4, comes with 45 scalable typefaces (35 Intellifont and 10 TrueType). The 4P's paper tray holds 250 sheets (the 4L provides a 100-sheet tray). Like the 4L and the 4, the 4P offers enhanced HP PCL 5 printer language and HP's Resolution Enhancement technology, which smooths the edges of text.

You can move up to PostScript by means of a $299 SIMM upgrade. PostScript also requires an additional 4MB of RAM. (The 4L doesn't upgrade to PostScript.) If you know that you want PostScript, consider the 4MP.

Its auto–language switching feature lets you set the printer to adjust automatically to documents composed for PostScript or PCL 5. This model also includes 80 scalable typefaces and 6MB of memory expandable to 22MB. The 4MP uses a 20-MHz RISC processor and offers LocalTalk, serial, and parallel interfaces.

The 4P and 4MP will run on a network, though their 4-ppm speed makes the LaserJet 4 the better choice.

These high-resolution personal printers are a compelling option for anyone producing graphics-laden presentations or desktop published documents.

—Laurianne McLaughlin

Hewlett-Packard HP LaserJet 4P, 4MP

Two hot printers that provide 600-dpi printing at a low price. But at 4 ppm, you'll pay a price in print speed.

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Pricing: 4P $1229, 4MP $1729

Availability: October 25

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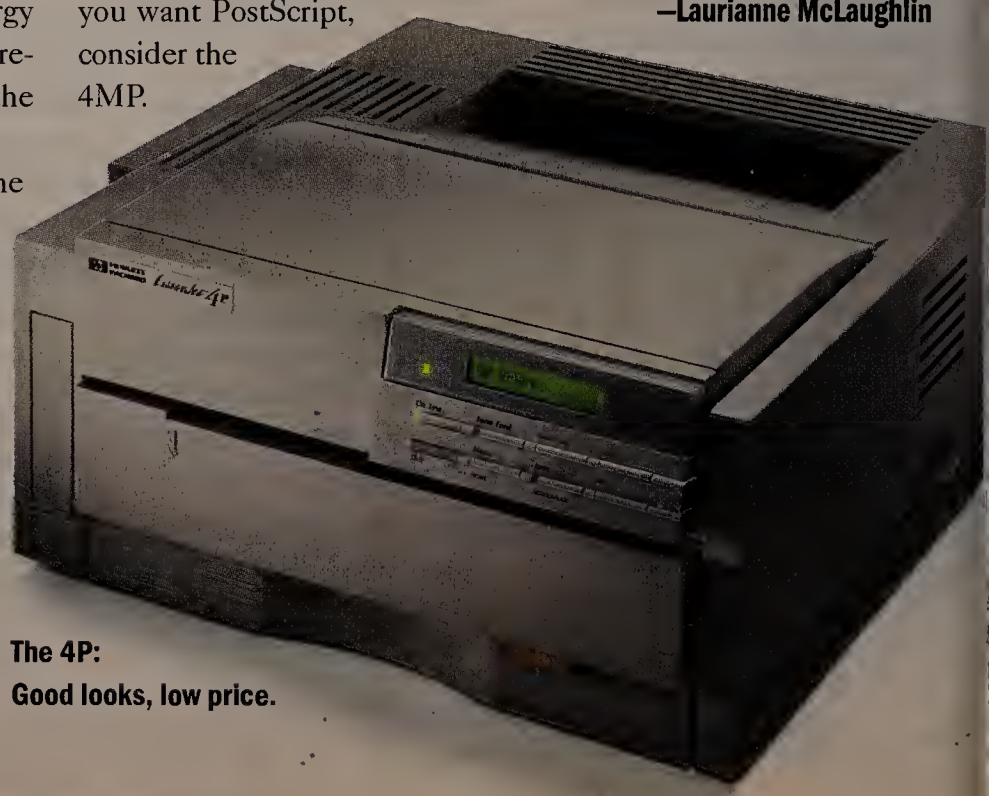

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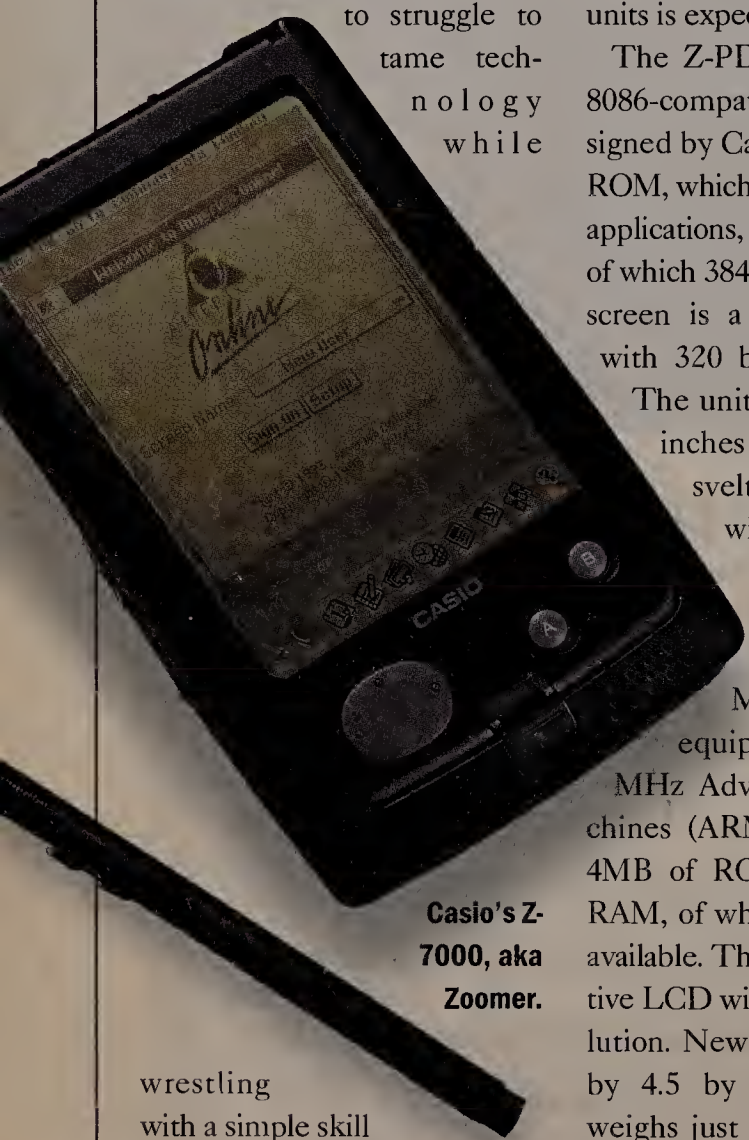
Power in Your Palm?

TEST DRIVE ▶ Small and light enough to go anywhere you take your wallet or purse, personal digital assistants (PDAs) promise to bring computing to new users and provide corporate road warriors with a competitive edge: instant access to information. Unfortunately, in our first encounters with these devices, we found them more annoying than helpful.

The first PDAs—Apple's Newton MessagePad and Tandy's Z-PDA Zoomer Personal Digital Assistant (also marketed as Casio's Z-7000 Personal Digital Assistant)—forced us to struggle to tame technology while wrestling with a simple skill we haven't had trouble with since the third grade: penmanship. The basic task of using an electronic pen for input and handwriting recognition proved to be a frustrating hurdle.



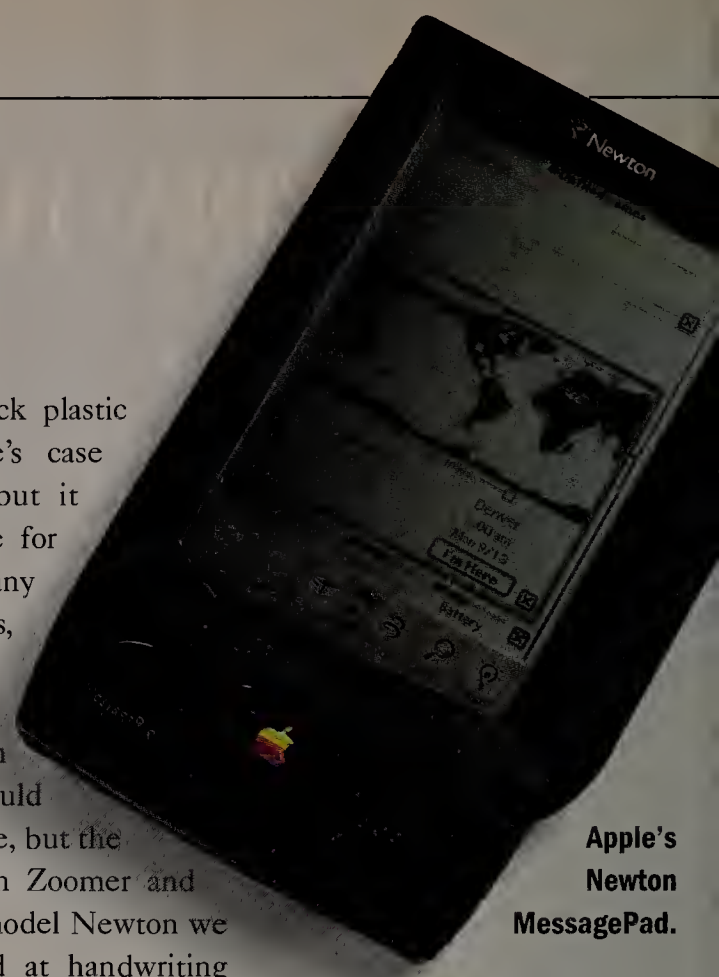
Casio's Z-7000, aka Zoomer.

Both the Newton MessagePad and the Z-PDA Zoomer are based on an electronic organizer. They include a notepad, a to-do list, an appointment book, an address book, a world clock, a calculator, and a forms calculator for tasks such as weight conversions. The Z-PDA also includes a trimmed-down version of the personal finance package Quicken, America Online (the modem is extra), a 26-language translator with a 1000-word-per-language database, and three games. Additional software for both units is expected.

The Z-PDA uses a 7-MHz 8086-compatible processor designed by Casio. It has 4MB of ROM, which contains the unit's applications, and 1MB of RAM, of which 384K is available. The screen is a nonbacklit LCD with 320 by 256 resolution. The unit is 1 by 4.2 by 6.8 inches and weighs a svelte 15.3 ounces. It will operate for up to 100 hours on three AA batteries.

Apple's Newton MessagePad comes equipped with a 20-MHz Advanced RISC Machines (ARM) 610 processor, 4MB of ROM, and 640K of RAM, of which about 190K is available. The screen is a reflective LCD with 336 by 240 resolution. Newton measures 7.25 by 4.5 by 0.75 inches and weighs just under a pound. It runs for 54 hours on four AA batteries.

Newton ships with a leather slip case to protect its screen, while the Tandy/Casio product has a flip-back plastic cover. Apple's case looks good but it lacks a place for the modem, any extra batteries, or an AC adapter. In theory, both devices should be easy to use, but the preproduction Zoomer and production model Newton we used faltered at handwriting recognition, which is how they receive input. And the Newton was buggy for a shipping product, a problem Apple has tried to remedy with ROM updates.



Apple's Newton MessagePad.

Newton uses a dictionary of some 800 words and guesses at your intentions to find a match. When it's wrong, you can correct it with an on-screen keyboard. You also teach Newton new words this way. So eventually, it probably will learn your handwriting—as long as you don't use a lot of proper nouns, which aren't likely to be in the dictionary. This inability to recognize proper nouns makes the Newton MessagePad impractical as a personal information manager, though it's well suited to repetitive, form-based apps such as inventory management.

Power Ink

The Z-PDA uses a more flexible approach that takes into account the poor state of handwriting recognition. You can mix character recognition with "Power Ink"—a bit map of your unaltered scribblings. This capability lets you selectively use recognition, say, for the last name of an entry in your address database or a keyword from a meeting, so those fields can be searched later, and use straight handwriting for everything else. The Z-PDA supports deferred recognition, so you can use the horsepower and full-size keyboard of your desktop PC to process your input when you like (you'll need an optional PC connection).

While Newton fails at reading your handwriting, it does presage a future in which Apple hopes to deliver an assortment of "smart" consumer electronics devices. On the MessagePad, the first sign of this brainy new world takes the form of a special Assist button. Press it, and Newton will attempt to complete whatever action is indicated. So if you can get it to recognize the words "Call Andy at 9 p.m." (which Newton interpreted as "thereby 8PM") and press the Assist icon, Newton will prompt you with a dialog scheduling a voice or data call to, well, Cindy, as it turned out in a test.

Although these devices are meant to be personal, they can play with their digital brethren. With the built-in infrared transceiver, you can beam information directly to another Newton or a Sharp OZ/IQ 9000. With an optional 9600/2400 fax/data modem, you can send but not re-

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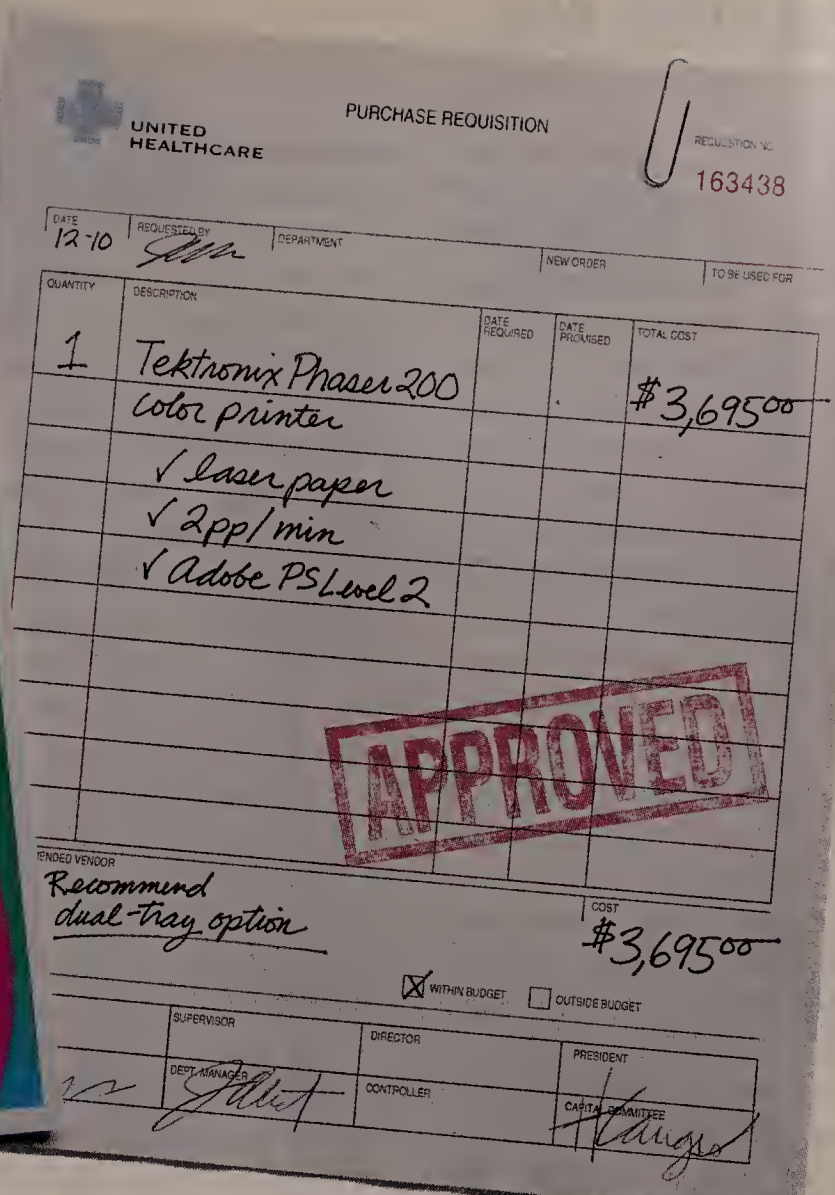

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Circle 124 on reader service card

Continued from page 84

ceive faxes and both send and receive text items. Data transmissions must go through an Apple communications network, which had not been established at press time and which costs extra. Also, Apple's modem is an extra device to carry around, although it could have gone into Newton's built-in Type II PCMCIA expansion slot on a PCMCIA card. The Z-PDA also has a Type II slot, which will accept several third-party modems, although you can only call into the America Online service.

Newton plugs directly into Apple printers, and with the Print Pack it plugs into most popular DOS printers. And both Newton and the Z-PDA will have connection kits for DOS PCs, and Newton will also talk with Macs. Both machines come with infrared transceivers for sharing data with like devices as well.

While PDAs aim to attract users who might not have a portable computer right now, Jeffrey Henning, senior industry analyst at BIS Strategic Decisions in Norwell, Massachusetts, believes early adopters will be technophiles.

"The Newton is the more revolutionary of the devices, but that comes at a price," says Henning. "A lot of its innovations are very immature, so you're not realizing the full benefit of them now. If you bought one for use as an address book, you would feel ripped off. They're first-generation products. They don't live up to some of the advance billing. They're important for what they will become, but they're like the first PCs that you had to build from a kit."

While Newton might be suitable for mobile workers whose jobs revolve around forms, the Z-PDA is an acceptable personal organizer, largely due to its more flexible handwriting recognition and inking features. Unless pen input is a real selling point for you, however, you may want to consider another option, such as the Hewlett-Packard 100LX (see *Top of the News*, June), which fits in a pocket, has a tiny keyboard, and functions as a full 8088 PC, with built-in cc:Mail and 1-2-3. After immersing myself in PDA technology for two months, that's where my money went.

—Joe Abernathy

Tandy Z-PDA Zoomer Personal Digital Assistant (Casio Z-7000 Personal Digital Assistant), Apple Newton MessagePad

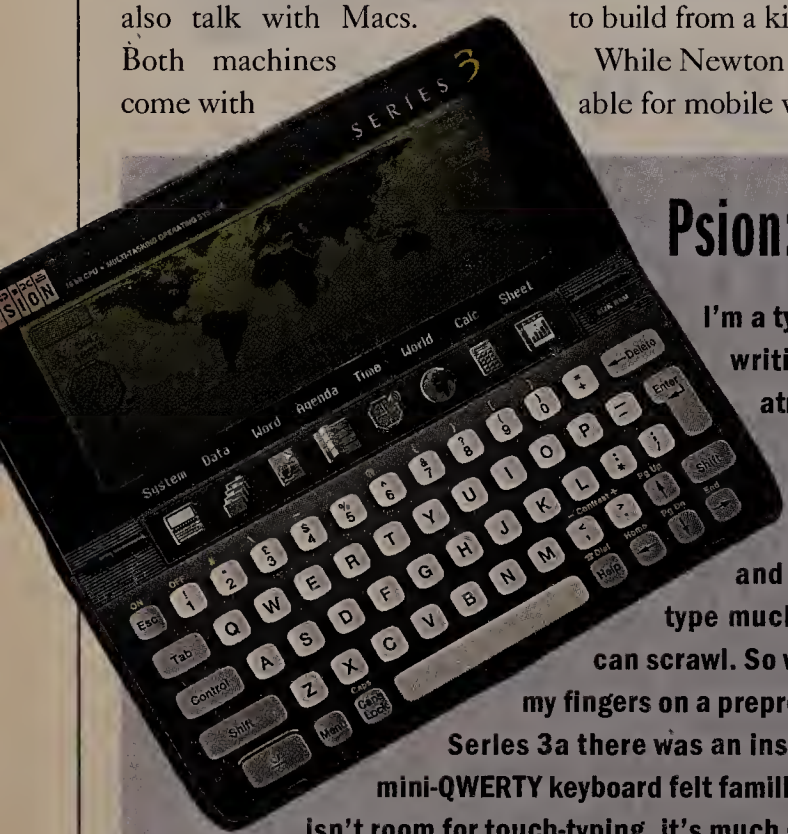
The personal digital assistant has arrived, but we've found these devices to be less than practical. For now Jeeves still has a job.

Tandy Z-PDA (Casio Z-7000)

Key Features: Usable mix of handwriting recognition and free-form "ink" • Hefty software suite
Pricing: $699
Availability: October; Radio Shack outlets, September; Casio dealers
Tandy Corp.
Reader service no. 685

Apple Newton MessagePad

Key Features: Immature handwriting recognition • Especially good for repetitive form-based tasks • Intelligent Assist button
Pricing: Beginning at $699
Availability: Immediate
Apple Computer Inc., 800/365-3690, 408/996-1010
Reader service no. 686



Psion: The Alternative Palmtop

I'm a typist. My handwriting is really atrocious—sometimes I can't even read my own notes—and I can touch-type much faster than I can scrawl. So when I first got my fingers on a preproduction Psion Series 3a there was an instant bond; the mini-QWERTY keyboard felt familiar. While there isn't room for touch-typing, it's much more spacious than the densely packed HP 100LX keyboard. Entering data is easy, and there's never the problem with character recognition that befuddled Apple's Newton MessagePad and Tandy's Z-PDA Zoomer.

You get pretty much the same functionality with the Psion as with the Newton and the Z-PDA. There's a Microsoft Word–compatible word processor, a scheduler, a calculator, a world clock, a 1-2-3–compatible spreadsheet, a database/address book, and a unique voice-recording facility.

The unit has two solid-state disk drives—like PCMCIA but not compatible with it—that can act as additional drives for applications and storage beyond the 256K of RAM or 512K of RAM that ships with the unit ($495 and $595, respectively).

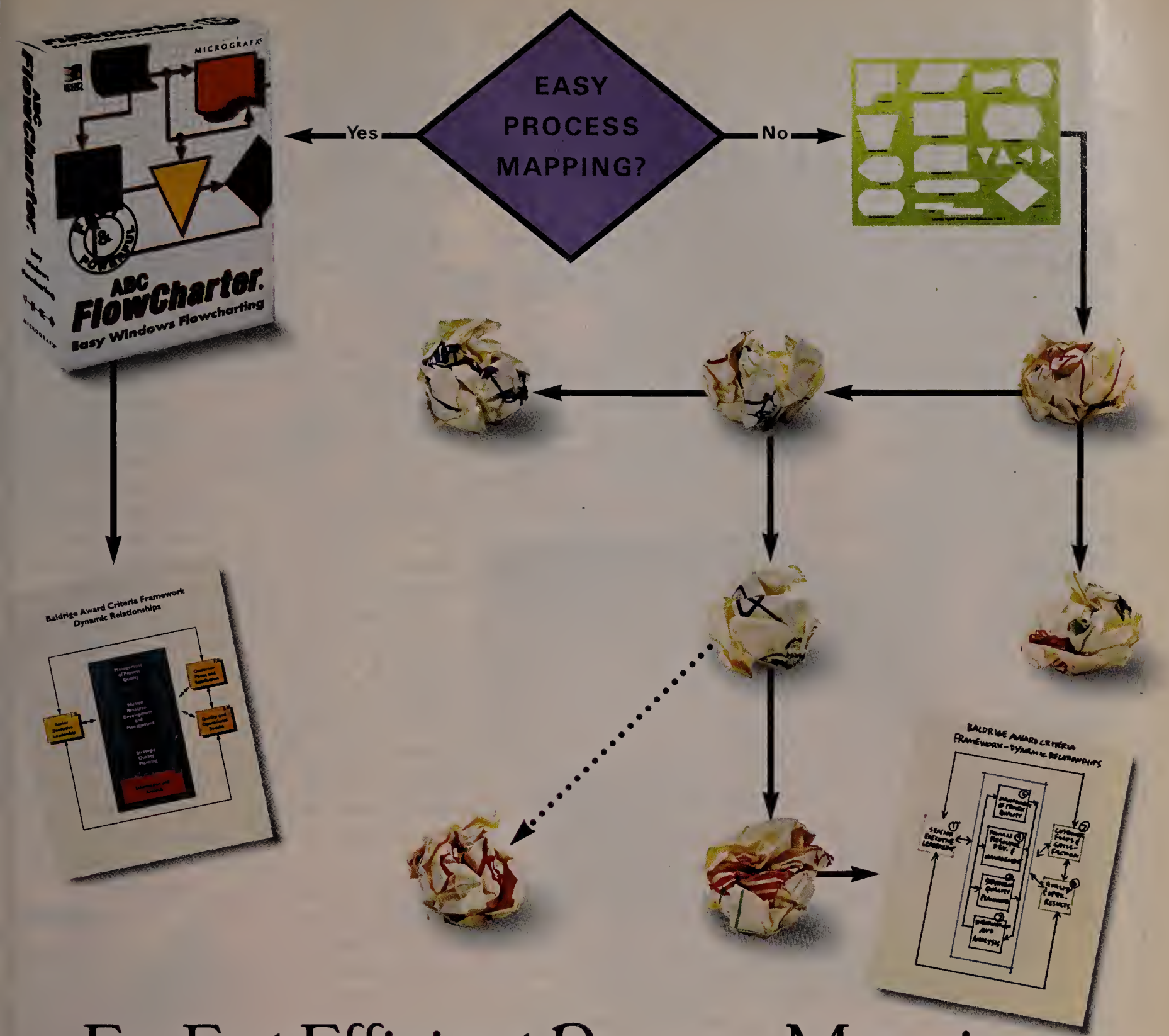
The 80-character-by-18-line CGA screen is easy to read, and you can select from three fonts in four sizes. The Psion Series 3a runs on two AA batteries, which the company claims you can expect to last for about 120 hours with normal use. The unit fits easily in your pocket or purse, measuring 6.5 by 3.3 by 0.9 inches and weighing less than a pound.

Navigating through the applications is easy—you can press icon keys or highlight the on-screen icon and press <Enter>. Thanks to Psion's 7.7-MHz custom processor, built around an NEC V38 (an 8086-comparable CPU), data searches are relatively fast. A dialing facility even lets you quickly call around the globe.

Though I didn't write a macro with the unit's programming language to broadcast a voice recording, I could have. The 3a can tap your business creativity and perform all the personal information manager functions you need to stay on schedule and in contact. Besides that, it's cool.

The Psion 3a is available now through the Sharper Image. Psion Inc., 508/371-0310, 508/371-9611 (fax). Reader service no. 693

—Russell Glitman



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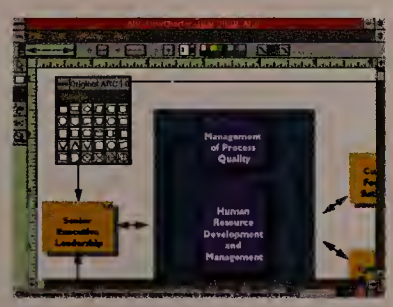

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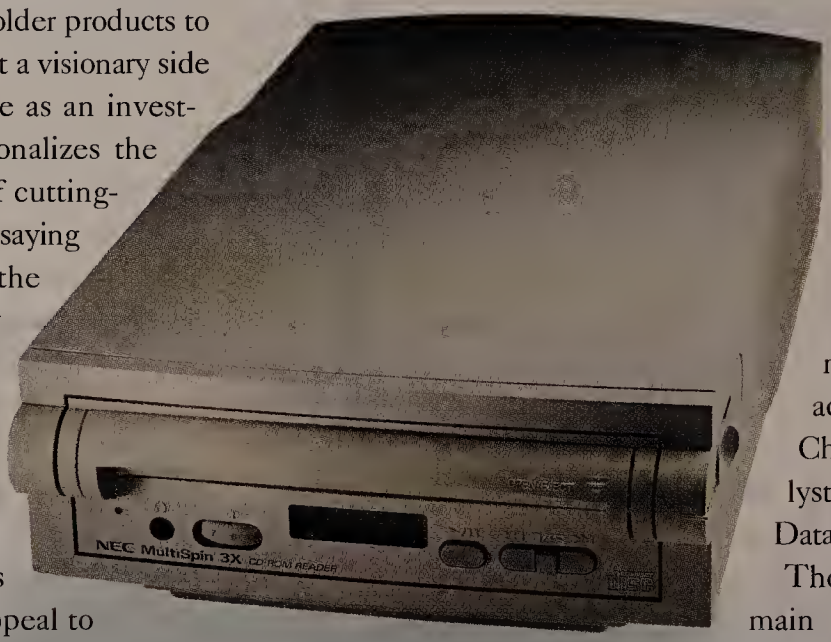
The Fastest CD ROM Drives

TEST DRIVE

Inside every PC buyer, two opposing forces are at work. A pragmatic side wants you to purchase only current-generation, time-tested products that solve existing problems. This side says you'll be content to wait until a new technology becomes mainstream and inexpensive before you trade up and pass your older products to other users. But a visionary side views hardware as an investment and rationalizes the higher price of cutting-edge products, saying you'll recoup the investment by not having to upgrade.

NEC's new MultiSpin 3X family of CD ROM drives is designed to appeal to your visionary side. These devices, which offer the fastest data transfer rates available for CD ROM drives in this price range, promise better multimedia video performance, particularly improved color, smoother motion, and larger images. Other benefits include faster searches on databases, shorter waits for large images such as photographs to appear on screen, and quicker installation of programs distributed on CD ROM. The only hitch is the price: They cost about 30 percent more than slower drives and won't offer significant performance improvements with CD ROM software until developers create products that harness the additional power.

The MultiSpin 3X family includes the $600 3Xe external drive, the $500 3Xi internal drive, and the $455 3Xp personal/portable drive (all prices are estimated selling prices provided by NEC). These triple-speed devices feature 450-kilobyte-per-second (K/sec) data transfer, which pumps 50 percent more data than the double-speed 300K/sec rate recently approved for MPC Level 2, the new standard for multimedia PCs. To further improve performance, particularly on database searches, NEC boosted the average access time. The internal and external models are rated at 195ms, about a third faster than the 280ms offered on NEC's double-speed models. The portable model is rated at 240ms, a dramatic improvement over its 400ms double-speed predecessor. All include 256K of cache.



Pragmatic Disappointment

We reviewed a preproduction 3Xe external model, and our pragmatic side was a little disappointed. After testing several common CD ROM–based applications, we noted only minor performance improvements over times posted by a double-speed drive. The problem, NEC said, was that the standard applications we tested—CorelDraw 3.0, Microsoft's Video for Windows, and a database of computer periodicals—had not been optimized for triple-speed drives. Considering that high-quality double-speed drives are expected to cost about $150 less than the 3Xe, we needed a powerful argument from our visionary side to justify the extra expense. That justification should appear in mid-1994, when software optimized for triple-speed drives is expected to become more widely available, according to Patty Chang, an industry analyst at market researcher DataQuest.

Though speed is the main feature of these drives, the devices look and act more like consumer appliances than institutional computing products. The 3Xe is sleek and rectangular, measuring about 13 inches deep by 7 inches wide by 3 inches high. (Its double-speed predecessor measured a boxy 10 by 9 by 3 inches and sported visible screwheads.)

One new feature we found useful but awkward was the LCD readout, which offers three modes that tell you important operating information. One mode tells when the drive is busy and whether it's operating at triple speed or single speed (you'd want the device running at the lower speed to conserve power when operating the portable model from a battery). A second mode, designed for music lovers, lets you know which track is playing, and a third mode provides error messages. Though all are useful, the LCD is readable only when you're right in front of it. Unless your drive is at eye level, this limitation can literally be a pain.

The external and portable models are the first NEC drives that can serve as stand-alone audio CD players.

Like their predecessors, the 3X products are compatible with popular CD formats, including Kodak's multisession Photo CD. The drives also have automatic lens-cleaning features and dust-protection doors. All products include a two-year warranty, which almost guarantees that when new high-performance CD applications hit the market in mid-1994 as expected, your investment will pay off because you won't have to buy another drive.

—Randy Ross

NEC MultiSpin 3X CD ROM Drives

Fastest, feature-rich drives.
Key Features: 450K/sec data transfer • Internal and external models offer 195ms access times • External and portable models double as stand-alone audio players
Pricing: Estimated street prices from NEC: MultiSpin 3Xi (internal) $500, MultiSpin 3Xe (external) $600, MultiSpin 3Xp (portable) $455; 16-bit SCSI II adapter and cable $125, battery and charger for portable $90
Availability: Immediate
NEC Technologies Inc., 800/632-4636, 708/860-9500
Reader service no. 683

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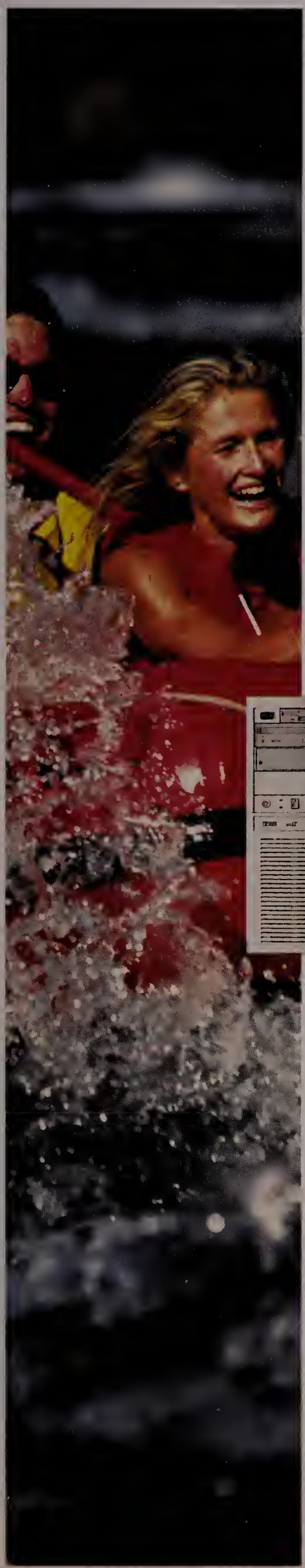

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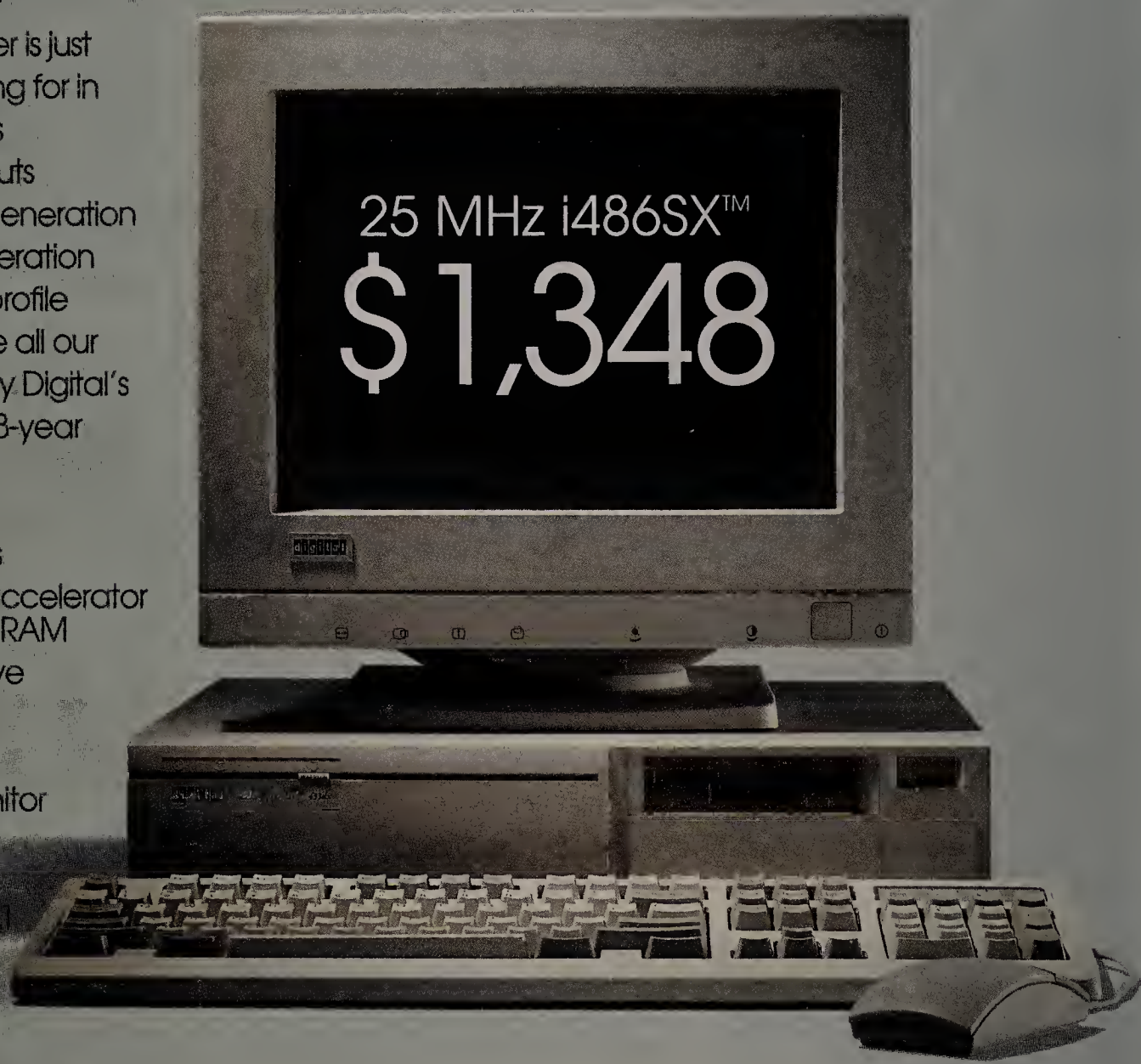

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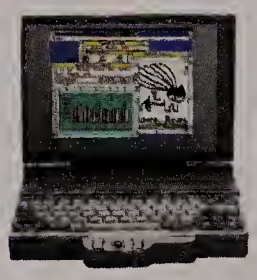	• **25MHz i386SL** (mono) **$2,149** • **25MHz i386SL** (passive matrix color) **$2,699** • **25MHz i486SL** (mono) **$2,499** • **25MHz i486SL** (active matrix color) **$3,999** • **Lease for as low as $75/Month**	• 4 MB RAM • 64 KB cache • 120 MB removable hard drive • 2 PCMCIA slots • 4 MB RAM • 120 MB removable hard drive • 2 PCMCIA slots	• 3.5" floppy drive • Pre-installed MS-DOS 6.0/ Windows 3.1 • BitFAX/BitCOM software • 6.5-hour NiMH battery • AC adapter • Snap-on trackball
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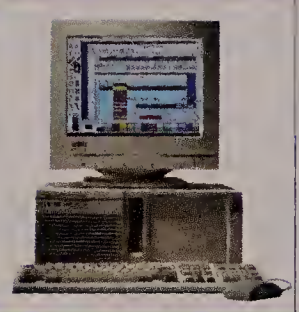	• **33MHz i486SX** **$1,598** • **33MHz i486DX** **$1,848** • **50MHz i486DX2** **$2,048** • **66MHz i486DX2** **$2,248** • **Lease for as low as $56/Month**	• VESA-VL bus GUI accelerator • 4 MB RAM • 1 MB video RAM • 170 MB hard drive • 6 ISA slots (2 VESA-VL slots) • 5 drive bays • OverDrive Processor upgrade	• Pentium™ OverDrive Processor upgrade • 3.5" floppy drive • 14" SVGA(i) color monitor • Microsoft's Ready-To-Run MS-DOS 6.0/Windows 3.1 • Mouse • 101-key keyboard
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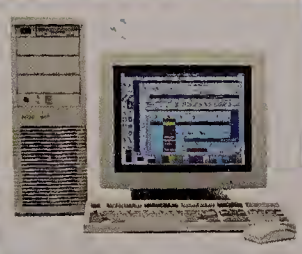	• **60MHz Pentium** **$6,643** • **66MHz i486DX2** **$3,578** • **50MHz i486DX** **$3,528** • **Lease for as low as $123/Month**	• 64-bit Pentium processor* • 4 or 8* MB RAM • Up to 256 KB cache • 245 MB SCSI hard drive • 6 EISA slots • 5 drive bays	• User-upgradeable CPU • 3.5" floppy drive • Microsoft's Ready-To-Run MS-DOS 6.0/Windows 3.1 • 101-key keyboard • Mouse *With Pentium systems

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NEC and IBM Roll Out Budget 486 Desktops

The same money that bought a no-name 486 clone last year now buys a feature-rich system from top-tier vendors such as NEC and IBM. NEC has added local bus video, power management, and Pentium OverDrive sockets to its Ready and PowerMate PCs, with prices starting at around $1000. IBM has added low-priced models—albeit with graphics and upgrade compromises—to its ValuePoint line, with prices starting at $1090.

NEC Adds Features

While NEC's Ready line targets small business and home-office users, its pricier PowerMate family is geared toward corporate buyers. The two lines use identical components and offer one year of on-site service, but the PowerMates come with a two-year parts and service warranty. To make Ready systems easy to get started, NEC includes a setup video and a preloaded software suite with PFS:WindowWorks 2.0, Delrina WinFax Lite, and one-month trial memberships to CompuServe and America Online.

NEC's revamped Ready and PowerMate systems offer performance enhancements also found in the company's high-end Image line, including local bus video and NEC's OptiBus I/O technology, which speeds up hard drive access time. An improved graphics subsystem supports 256 colors at 1024 by 768 resolution, or 16 million colors at 640 by 480 resolution.

Speed demons will appreciate the 238-pin ZIF socket for Intel's Pentium OverDrive chip, scheduled for release next year. Each system comes with 4MB of RAM (expandable to 36MB), a socket for an optional 256K secondary cache, three open ISA slots, and one open drive bay, accessible from the unit's front. NEC's new systems meet EPA Energy Star Level 1 guidelines, which means PC and monitor power down to under 30 watts each after a user-defined time period.

With a 25-MHz 486SX, 4MB RAM, and a 170MB hard drive, the Ready 425es costs $999. (Add $355 for a 14-inch SVGA monitor with .28mm dot pitch.) The Ready 433es and 466es include an internal 2400/9600 data/fax-modem and Ready Remote—support software that allows NEC technicians to dial into your PC to solve problems. With a 210MB hard drive but no monitor, the Ready 433es (486SX-33) costs $1299; the Ready 466es (486DX2-66) with a 250MB hard drive is $1899.

The $1049 PowerMate 425es (486SX-25) and $1425 PowerMate 433es (486DX-33) come with a 170MB hard drive. The PowerMate 466es (486DX2-66) with a 170MB hard drive costs $1845. The monitor is extra.

IBM's New ValuePoints

While NEC brings high performance features to its entry level lines, IBM takes a different approach: adding new machines to the low end of its ValuePoint line. These PCs—the ValuePoint Si series—cut $70 to $120 off standard ValuePoint series prices by reducing graphics power and upgradability.

While the ValuePoint Si systems feature VESA local bus on the motherboard, they don't include an available VL-bus slot. The Si's use inferior graphics accelerators and come with 512K DRAM, upgradable to only 1MB (rather than the 2MB of earlier ValuePoints). 1MB limits you to a maximum of 256 colors at 1024 by 768 resolution; with 2MB you get 64,000 colors.

Other compromises abound. The ValuePoint 425SX/Si does not offer an optional secondary cache or a Pentium OverDrive socket. And while the ValuePoint 433DX/Si does accept up to 256K of secondary cache and a Pentium OverDrive chip, it lacks a ZIF socket, making upgrading the CPU more difficult.

All the Si's accept up to 64MB RAM, (using 16MB SIMMs) and provide three open ISA slots and one open drive bay, as do small-footprint ValuePoints. The 425SX/Si includes a 25-MHz 486SX processor, 4MB RAM, a 120MB hard drive, and an IBM basic keyboard for $1090. The basic keyboard uses the same frame as an IBM enhanced keyboard, but the keys don't click, and felt mushy. If you do a lot of typing, the IBM basic keyboard may not be worth the $40 savings.

These prices don't include monitors, so add an extra $379 for a 14-inch SVGA monitor with .28mm dot pitch.

—Laurianne McLaughlin

NEC's READY PC, targeting small businesses and home-office users, comes with a setup video, preloaded software, and one year of on-site service.

NEC Ready, PowerMate; IBM ValuePoint Si

NEC adds features to its low-end PCs; IBM cuts prices and features.

List prices (without monitors): approximately $1000 to $2000

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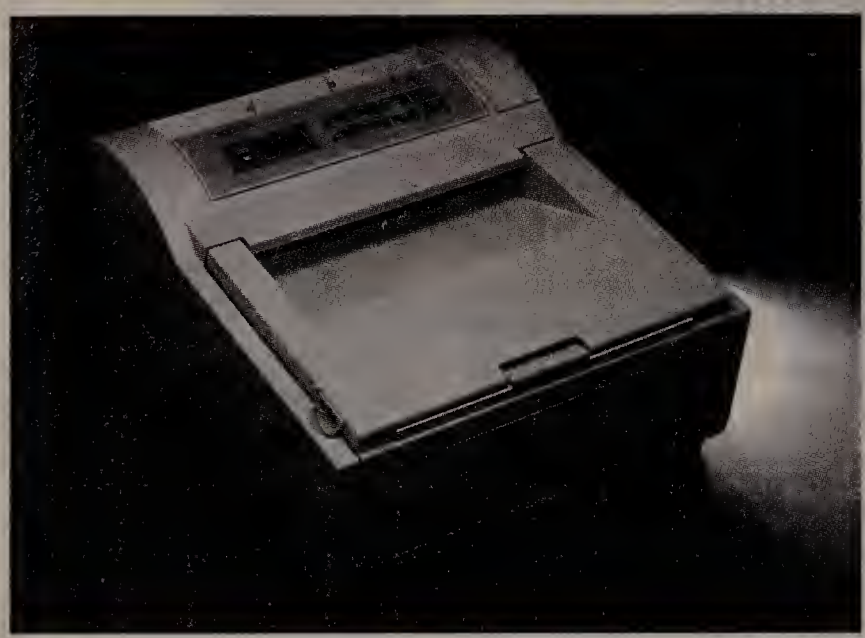
IBM PC Company
800/426-2968

Okidata OL400e: Small, Fast, and Inexpensive



OKIDATA'S OL 400E provides low-cost laser performance in a compact package that requires about a square foot of desk space.

Until recently, buying a laser printer for a cramped office meant settling for a bulky, industrial-looking device that cost about $1000. But all that has changed. First, Hewlett-Packard introduced the sleek $849 LaserJet 4L. And now, Okidata has rolled out the OL400e: a $699 LED printer that offers better performance and one of the lowest prices around for a laser-quality device. It includes a low-power mode that saves electricity during idle time. On the downside, the OL400e just misses the HP 4L's standard in output quality and appearance.

Like the LaserJet 4L, the OL400e is compact, sleek, and requires about as much desk area as an open magazine. Both 300-dpi printers offer 100-sheet paper feeders and are powered by 4-ppm engines. Neither product can be upgraded to PostScript. In *PC World* tests, the printers produced standard word-processing documents at about the same speed. But with complex documents, the differences become more apparent: The OL400e printed a sample newsletter in about a third less time, but the LaserJet 4L output had fewer jaggies.

The added speed of the OL400e is mainly attributable to its MIPS R3000 RISC processor. The HP 4L relies on a Motorola 68000, an older, non-RISC processor. But to keep the price low, the OL400e excludes resolution enhancement technology and internal scalable fonts. These features, included in the HP 4L, decrease jagged edges, particularly in large type (which is often used in newsletters, fliers, and brochures).

Some smaller differences between the two printers take on large meaning if you're short on office space. If printer area is a consideration, the OL400e's 14.2-by-12.6-inch footprint is a better bet—it's about 2 inches slimmer than the HP 4L. If aesthetics are more important, then the HP 4L—which offers side doors to hide unsightly power and printer connectors—may be a better choice. (Protruding cable connectors can add about 2 inches to a printer's length.) Unlike the HP 4L, the OL400e sports the traditional and unsightly LCD readout panel, which displays printer option menus and error messages.

Still, the OL400e provides a lot of printer for the money.

—Randy Ross

Okidata OL 400e printer

This compact printer offers denizens of confined offices a new low-price option.
Okidata
800/654-3282
List price: $699
Reader service no. 646

NEC Splits Monitor Line, Adds Low-Cost Models

NEC Technologies is dividing its standard-setting multiscan monitors into three product lines: The V series, for budget-conscious, entry-level buyers; the E series, which complies with the government's new Energy Star power-management specification; and the high-end P series, which replaces the current FG line and adds both power management and antiglare coatings.

The introduction of the V series started in June with the release of the plainly named SVGA display, a 14-inch monitor with an estimated street price of $355. For the money, buyers got the NEC name, resolutions as high as 1024 by 768, and refresh rates up to 76 Hz (at 800 by 600). More recently, the SVGA was joined by the 15-inch MultiSync 3V, which has roughly the same resolution and refresh specs as the SVGA and should sell on the street for around $550.

The E series of MultiSyncs includes the 15-inch 3FGe, 15-inch 4FGe, and 17-inch 5FGe. All three use what NEC calls Intelligent Power Management (IPM), which means they consume less than 30 watts during periods of inactivity. Both the 4FGe and the 5FGe support ergonomic refresh rates (70 Hz or higher) at 1024 by 768 resolution; the 3FGe supports them up to 800 by 600 only.

Finally, the new P models—the 17-inch 5FGp and 21-inch 6FGp—include IPM and anti-glare coating. Anti-glare coating is a new and much needed technology for NEC, which in the past relied on add-on lenses to cut background glare. Both models ean display up to 1280 by 1024, with refresh rates of 74 Hz and above.

—Dan Miller

NEC V, E, and P MultiSync monitors

NEC divides its monitors into three distinct product lines.
NEC Technologies Inc.
800/632-4636, 508/264-8000
Estimated list prices: SVGA $355, MultiSync 3V $550, MultiSync 3FGe $635, MultiSync 4FGe $755, MultiSync 5FGe $1155, MultiSync 5FGp $1455, MultiSync 6FGp $2535
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JULY 1992 MX 17F

A DREAM MACHINE!

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MAG INNOVISION, INC.
2801 SOUTH YALE STREET
SANTA ANA, CA 92704

MAG INNOVISION ™

Circle 169 on reader service card

INTRODUCING WORDPE
IT'S WINDOWS THE W

Of all the things people do with personal computers, word processing may be the most personal.

Nobody writes the way you do. Nobody gets the same assignments or tackles them the same way. And nobody understands that better than WordPerfect®, the worldwide word processing leader.

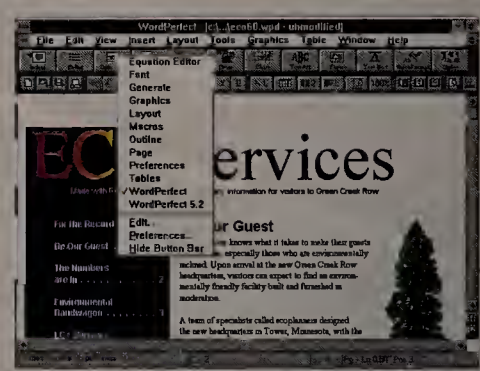
That's why we're excited to introduce WordPerfect 6.0 for Windows. We didn't design it to be the perfect writing tool for the *average* user. We designed it to be the perfect writing tool for *you.*

MAKE IT YOUR OWN.

Which features of your word processor do you use most often? Are they organized so that you can get at them quickly?

WordPerfect 6.0 gives you direct, one-click access to *any* command, process or macro in the program. Just drag your favorites to a context-sensitive Button Bar™ and arrange them any way you like.

You can even drag in other Windows applications and files and launch them from within WordPerfect. (How's that for easy integration?)



How it looks is up to you. Because every aspect of the WP interface can be easily customized.

You can quickly create customized interfaces to streamline the writing of reports, memos or letters. Or you can simply use any of 70 professionally designed ExpressDocs™ templates included in the package.

And it's not just commands you're in command of. Virtually every element of the interface — including how it looks and feels—is yours to do with as you will.

Now, you can create 3-D charts from table and spreadsheet data without ever leaving WordPerfect.

It's the most easily customized word processor ever to come out of a box.

* LIMITED TIME OFFER. WORDPERFECT IS A REGISTERED TRADEMARK OF WORDPERFECT CORPORATION WITHIN THE UNITED STATES AND OTHER COUNTRIES. ALL OTHER BRAND AND PRODUCT NAMES ARE TRADEMARKS OR REGISTERED TRADEMARKS OF THEIR RESPECTIVE COMPANIES. © WORDPERFECT CORPORATION 1993.

ECT® 6.0 FOR WINDOWS.
Y YOU WANT IT TO BE.

GETTING HERE WILL BE EASY.

With more than 100 built-in spreadsheet functions and advanced charting and drawing capabilities, this is the most powerful program WordPerfect has ever developed. But how difficult will it be putting all this power and flexibility to work?

If you've used WordPerfect on another operating system, you and your existing documents and macros will feel right at home here. This is the WordPerfect you know, in a friendlier, more accommodating environment.

There's an on-line tutorial for first-timers, of course. But there are also interactive Coaches smart enough to lead you step-by-step through sophisticated operations, not on *sample* documents, but on *your* documents. And if you have any questions, WordPerfect's support people (widely acknowledged to be the best in the business) are standing by to help.

THE BEST REASON FOR MOVING TO WINDOWS.

This is everything WordPerfect has learned about word processing over the years, combined with all the advanced ease-of-use capabilities of the Windows environment.

It connects your documents directly to other powerful Windows applications, and to the rest of the business world. And the power of WordPerfect 6.0 is all yours.

Borland®
Quattro® Pro 5
INSIDE SPECIALLY MARKED BOXES*

To claim it for yourself, visit your local reseller and ask about the special introductory offer with Quattro Pro 5.0. For a free demo disk or to order directly, call WordPerfect at (800) 526-5198.

- Document templates
- Spreadsheet functions
- Interactive Coaches
- Sophisticated drawing tools
- Direct spreadsheet import
- Document management
- Graphics editing
- Irregular text wrap
- Borders
- Full WYSIWYG in all views
- Power bar
- Indexing and text retrieval
- Quickmenus
- Direct database import
- Styles
- Macros
- Auto macro conversion

WordPerfect®

6.0 FOR WINDOWS™

Fast, Robust Image Editing One Object at a Time

Altamira Composer

WINDOWS This image editor makes it fast and easy to create effects that once required both masterful skill with the mouse and extreme patience.
Altamira Software Corp.
415/332-5801,
415/332-5804 (fax)
List price: $795
Reader service no. 654

Image editors require skill, deftness, and patience—or at least a fondness for coffee breaks. But a new approach that's known as object layering changes all that. In a traditional image editor, you struggle with clumsy, inexact selection tools. With Altamira Composer, you just click on an object to select it. You create objects by drawing or scanning them in or by importing images. Import a hat from one place, a head from another, a body from somewhere else.

Once an object is on your canvas, use Composer's impressive selection of tools and filters to edit it. Paint effects on with a brush or apply them to an entire object; even with a stack of objects, only the selected one is affected. The program's strong point is composition. Its tools and effects stick to the traditional—such as dodge and burn, blur, sharpen, brighten—and its only creation tools are geometric shapes, to which you add surface textures. Composer will put surface textures on 3-D images created in CAD programs.

With Composer, compositions are made up of objects; every image you bring into the program becomes an object.

The fastest way to work in Composer is to make copies of an object and lay a correction on top, according to the vendor. That way, it's simple to retrace your steps. Once you have a composition you like, tell Composer to remember the position of its elements, and drag objects away to fiddle with the details. To get the original back, click the Home button. All the elements snap back into place.

Altamira Composer has an unusual interface, but it works. At first the icons are confusing, but thanks to a hint line that dangles from the mouse cursor, they're easy to learn. At $795, Composer is for those users who need a fast, powerful image editor to create and change complex compositions.

—Christina Wood

ALTAMIRA COMPOSER MAKES CREATING AND EDITING photo compositions a matter of pointing and clicking.

Two Enhancements for DOS Accounting Programs

Two new add-ins for DOS accounting programs can help managers save both time and money on preprinted checks and forms.

Unlike check-writing modules included in most accounting programs, Create-A-Check's $249.95 Create-A-Check Personal prints the whole check on blank check-stock paper. The secret is the magnetic toner cartridge that's shipped with the product. It prints with magnetic ink that a bank's check-processing devices can read. The cartridge is compatible with the Hewlett-Packard LaserJet II, IID, IIP, III, IIID, IIISI, 4, and 4L printers as well as with some Lexmark, Xerox, and Okidata printers.

Create-A-Check works transparently with entry-level accounting and personal finance packages. Its easy-to-use pop-up windows and menus are mouse responsive. The product can even sign your checks with a digitized signature. A $499.95 Professional version supports high-end accounting programs.

Create-A-Check offers security via layers of passwords. You could, for example, allow a clerk to enter addresses but not print checks. And since you're printing on blank paper, there are no preprinted checks that could be forged. One caveat before purchasing: Verify that your bank accepts these checks; not all do.

Also aimed at the do-it-yourself small business, Graphics Development's $79.95 FlashForm prints invoices, purchase orders, and statements on plain paper. FlashForm works with a number of accounting packages.

You can customize the product's forms with 40 logos from FlashForm's collection. Or, you can import your own graphics in PCX format. FlashForm prints multipart but not double-sided documents.

—Caroline Jones

Create-A-Check, FlashForm

Two money-saving add-ins for DOS accounting software: Create-A-Check prints checks, and FlashForm creates accounting forms.
Create-A-Check, Inc.
800/621-5720,
801/322-5222
List price: $249.95, Professional version $499.95
Reader service no. 680
Graphics Development Int'l
800/989-4434,
415/382-6600.
List price: $79.95
Reader service no. 655

AWARD-WINNING AXIK ACE CACHE SYSTEM

SuperValue-series

Intel® 486 processor, 8K cache
238-pin ZIF socket for Intel Pentium® Technology Ready Processors
4MB (70ns), 64KB cache, AMI BIOS
Teac 1.44MB floppy drive
Quantum 170MB IDE hard disk
Super VGA card, 1MB DRAM
14" SVGA, .28 Color Monitor, NI
Deluxe Mini-Tower, 230 Watt, 5 bays:
4 Ext: 2 51/4", 2 3 1/2"; 1 Int: 3 1/2"
2 Serial, 1 Printer, 1 Game port
Maxi Switch 101-key keyboard
Microsoft MS-DOS 6.2, Windows 3.1
Microsoft compatible mouse
Free One-Year On-Site Service

X-25/33: $1298/1398
X-33: $1498
X2-50/66: $1598/1698

Add $120 for 2nd Teac drive and Quantum 245MB upgrade)

Power-Series

- Intel 486 processor, 8K cache
- 238-pin ZIF socket for Intel Pentium Technology Ready Processors
- 8MB (70ns), 64KB cache, AMI BIOS
- Teac 1.2MB and 1.44MB floppy drives
- Quantum 245MB IDE hard disk, 15ms, 256KB hard disk cache
- Diamond Stealth Pro/VLB WinAccelerator, w/1MB VRAM, 16.7 million colors
- ADI Microscan 3G, 14", .28dp, 72Hz at 1024x768NI, WYSIWYG color, Flicker-Free, digital control SVGA color monitor
- 32-bit VESA VL-Bus IDE (2FD/2HD)
- Deluxe Mid-Tower, 250 Watt, 8 bays: 5 Ext: 3 51/4", 2 3 1/2"; 3 Int: 3 1/2"
- 2 Serial, 1 Printer, 1 Game port
- Maxi Switch ProKEY-124 keyboard
- MS-DOS 6.2, Windows 3.1, mouse
- Free One-Year On-Site Service

DX-33: $2198
DX2-66: $2398

SuperVLB-series

- Intel 486 processor, 8K cache
- 238-pin ZIF socket for Intel Pentium Technology Ready Processors
- 8MB (70ns), 256KB cache, AMI BIOS
- Teac 1.2MB and 1.44MB floppy drives
- Promise DC-4030VL IDE caching card, w/1MB cache, 0.2ms access time
- Quantum 245MB IDE hard disk, 15ms, 256KB hard disk cache
- Diamond Viper/VLB Window Accelerator, w/2MB VRAM, 16.7 million colors
- ADI Microscan 3G, 14" .28dp, NI
- Deluxe Mid-Tower, 250 Watt, 8 bays: 5 Ext: 3 51/4", 2 3 1/2"; 3 Int: 3 1/2"
- 2 Serial, 1 Printer, 1 Game port
- Maxi Switch ProKEY-124 keyboard
- MS-DOS 6.2, Windows 3.1, mouse
- Free One-Year On-Site Service

PC WORLD

November, 1993

DX-33: $2398
DX2-66: $2598

Ace Cache 486V/MPC

ntel 486DX-33, 8K cache
38-pin ZIF socket for Intel
entium Technology Ready
MB (70ns), 256KB cache,
AMI BIOS

PC MAGAZINE

Oct., 1993

'eac Combo drive: 1.2MB and 1.44MB
'romise DC-4030VL IDE caching card,
/1MB cache, 0.2ms access time
)uantum 245MB IDE hard disk, 15ms
)iamond Stealth 24/VLB, w/1MB DRAM
DI Microscan3G, 14", .28dp, NI
)eluxe Full-Tower, 250 Watt, 9 bays
Serial, 1 Printer, 1 Game port
Maxi Switch ProKEY-124 keyboard
MS-DOS 6.2, Windows 3.1, mouse
MPC sub-system:
'exel 3024 SCSI CD-ROM, 265ms, 300kb/s,
Multi-Session Photo CD
Media-Vision Pro Audio 16 Sound card
Compton's MPC Encyclopedia CD
Free One-Year On-Site Service

X-33: $2698

486DX2-66V/CD

- Intel 486DX2-66 processor, 8K cache
- 238-pin ZIF socket for Intel Pentium Technology Ready Processors
- 16MB (70ns), 256KB cache, AMI BIOS
- Teac 1.44MB floppy drive
- Sony 31A CD-ROM, controller card, cable & software
- Maxtor 340MB IDE hard disk, 13ms
- Diamond Stealth Pro/VLB WinAccelerator, w/1MB VRAM, 16.7 million colors
- 32-bit VESA VL-Bus IDE (2FD/2HD)
- ADI Microscan 4G, 15", Flat, .28dp, 1024x768NI/72Hz, 1280x1024NI/60Hz, Flicker-Free, digital control
- Deluxe Mid-Tower, 250 Watt, 8 bays: 5 Ext: 3 51/4", 2 3 1/2"; 3 Int: 3 1/2"
- 2 Serial, 1 Printer, 1 Game port
- Maxi Switch ProKEY-124 keyboard
- MS-DOS 6.2, Windows 3.1, mouse
- Free One-Year On-Site Service

DX2-66: $2955

Multi-Media

1. "Panasonic MPC Basic": • Panasonic CD-ROM, 390ms • Sound Blaster Pro Deluxe • Encyclopedia — $329
2. "Texel MPC Basic": • Texel DM-3024 Fast SCSI, 265ms, 300kb/sec • Pro 16 • One CD caddy — $559
3. "Toshiba MPC Basic": • Toshiba 3401B Fast SCSI, 200ms, 330kb/sec • Media-Vision Pro 16 • Kodak Photo Access CD — $629
4. Creative Lab "Discovery 8 CD Upgrade Kit": • 390ms CD-ROM, Sound Blaster Pro Deluxe, Multimedia Encyclopedia, Animals & Lemmings, Speaker Pair — $419
5. Creative Lab "Edutainment 16 CD upgrade Kit": • Sound Blaster 16 • MIDI Adapter • CD-ROM, 390 ms • Speaker pair • Multimedia Encyclopedia, Animals, Carmen San Diego? Deluxe, Money Island, Just Grandma & Me, Sherlock Holmes, Secret Weapons & Loom — $519
6. Media-Vision "Fusion Double CD16": • Philips fast CD-ROM • ProAudio 16 • Speaker pair • Carmen San Diego?, Compton's Multimedia Encyclopedia & Webster's Dictionary, Civilization, Mantis, Battle Chess — $629
7. Media-Vision "Multimedia System II": • NEC CDR-84, 280ms, 300kb/s Pro Audio Studio With Voice Recognition • Karaoke, Compton Interactive Encyclopedia, Mayo Clinic, Carmen San Diego? Civilization, Battle Chess, Mantis, Action — $899
8. Sony 31A CD-ROM, w/interface card — $199
9. Sound Blaster 16/16ASP sound card — $179/$199

CD Packs

Children Pack: $100
• Dinosaur Adventure • Mother Goose • Teacher Trouble • Beauty & Beast • MacMillan Dictionary for Children

Family Pack: $120
• Family Education Collection • Family Choice • Mayo Clinic Family Health Book • Family Doctor • Compton's Family Encyclopedia

Education Pack: $130
• MS Bookshelf • US History • US Atlas & Auto Map • Playing with Language • National Geographic Mammals

Business Pack: $130
• MS Works for Windows • America Business Phone Book • MS Bookshelf • Int'l Business & Economics Atlas • Tempra Access Photo CD

Game Pack: $100
• Chess Master 3000 • Space Quest IV • King Quest V • Stellar 7 • Wing Commander

(CD Packs are non-refundable items)

Other Upgrades:
- Internal Fax/Modem, 9600/2400, w/WinFax — $99
- Internal Fax/Modem, 14400/14400, w/WinFax — $229
- Colorado 250MB Tape Backup Drive, Internal — $199

Circle 4 on reader service card

ery Axik system is backed by:

0 -Day Money -Back Guarantee
ne-Year Limited Warranty
ree One-Year On-Site Service
ifetime Toll-Free Technical Support
ax Back Technical Support
-Year PC Design, Manufacturing, Quality Assurance,
ustomer Service and Support Experience
uality Components from name-brand manufacturers
uality Personnel for Product Assembly and Testing

System components:

- Hard Disk capacity is uncompressed capacity
- All 486DX-50 and 486DX2-66 systems come with CPU Heat Sink and Fan
- ProKEY-124 is 124-key, programmable
- WYSIWYG: What You See Is What You Get
- Microsoft MS-DOS 6.2 is the improved version on DoubleSpace data compression
- All Axik systems are turnkey systems
- Any Axik system will become Multi-Media PC with any of the MPC package

ik Profile

ik (pronounced as ASIC) Computer Inc. is a technology-focused company that specializes in helping user to meet the ds of personal computers/workstations. Using PC design, manufacturing and system integration experience since 1985, company was founded in March, 1990 in Sunnyvale, California. The first product was the very first 40/33 MHz US-Made motherboard announced in Comdex Fall, 1990. In 1991, Axik again announced its second-generation 486 motherboard uding its reputable 50MHz ACE CACHE 486. In its first two years, the company had developed, and manufactured several er high performance products for OEMs, distributors, and VARs. Axik Also provides technical and engineering support its customers, helping them adapt leading edge technology to their special requirements. From second quarter of 1992, System Division was formed to address the demand for direct-sale of the high quality 486 systems. Since then, Axik has ted emphasis to its 486 systems instead of the motherboard business. Within fifteen months, there have been thirty sys- s reviewed by all major magazines. Over ten Axik's systems were awarded "Best Buy/Editor's Choice/Recommendation".

ik Corporate Philosophy

ked by nearly a decade of PC design, manufacturing, QA, service and support experience, Axik's goals are clearly defined as:

To provide the Best Price/Performance, Quality, and "BEST OVERALL VALUE" products.
To provide the Best Customer Service, and Technical Support.
To introduce state-of-the-art products in a timely manner.
To welcome customized systems.
To deliver all products on schedule.

intel inside

MICROSOFT® WINDOWS™ READY-TO-RUN

PC WORLD BEST BUY

"If you want a speedy PC that can handle almost any office task thrown at it, the Axik Ace Cache is one of the best deals here"
Axik 486DX2-66 (Sept.1993)

PC WORLD BEST BUY

Axik 486DX2-50 (August, 1993)

" Axik has dealt another winning hand, It does a superior job of integrating components. The result is a PC that's dream to expand..." " Service and Support are also winners with Axik." " Best of All, we found no fault with Axik's responsiveness or accuracy."

PCComputing HARDWARE 200 1993 FINALIST

" Hardware 200, 1993: FINEST"
Axik 486DX-50 File Server (June, 1993)

PC WORLD BEST BUY

"Excellent customer service."
" In everything that really counts-performance and price-it's attractive enough to earn a Best Buy."
Axik 486DX2-66 (May, 1993)

PC WORLD BEST BUY

" Even in an excellent field, one system has to be the best, and this is it. Axik climbs to the top by offering great price/performance and customer service."
Axik 486DX2-66 (March, 1993)

BYTE

Editor's Choice
Axik 486DX-33 (Nov., 1992)

PC WORLD BEST BUY

Axik 486DX-33 (Nov., 1992)

" Every company starts small. And one of the ways a small company achieves the kind of universal recognition that firms like Dell and Compaq enjoy is by making a solid product at a fair price. If Axik keeps up the good work, household-name status could be just around the corner."

PCComputing

" Honorable Mentions"
Axik 486DX2-50 (August, 1992)

CBG &H BEST BUY

" Blows the competition out of door."
" Flat-out performance doesn't mean much if you're not getting value in other areas. The Axik 486/WB-50 uses high-quality components..."
Axik 486DX-50 (July, 1992)

COMPUTER SHOPPER

Axik 486DX-50 (July, 1992)

" When you put it together, it's hard not to like the Ace Cache. This is a finely crafted manchine made with quality parts. With the Ace Cache, you get great power, performance, and price. You really can have it all".

PC MAGAZINE

"#1 Best Price/Performance"
Axik 486DX-50 (June 16, 1992)

BUYERS ASSURANCE SEAL INFO WORLD

" In databse server tests, the Axik surpassed Dell, the previous leader, by 5 percent in transactions per minute (TPM). The Axik was 4 percent faster than ALR".

Axik 486DX-50 (Feb 24, 1992)

Axik Computer, Inc.
A Technical Services Company
1-800-234-2945
268 Santa Ana Court, Sunnyvale, CA 94086
Tel: (408) 735-1234 • Fax: (408) 735-1437
Mon-Fri: 8AM-6:30PM, Sat: 10AM-4PM (PST)

Call for system customization!

VISA MasterCard

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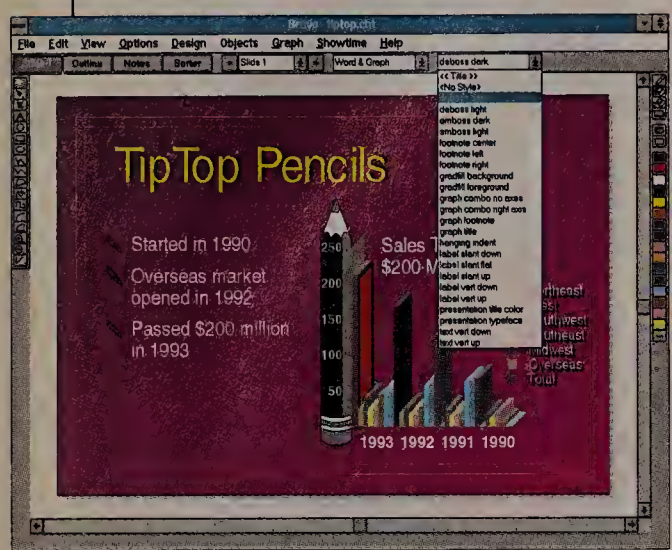
Three Cheers for Bravo's Presentations on the Cheap



YOU CAN SELECT TEXT OR AN OBJECT from Bravo's pulldown style sheet.

If you're prepared to spend $350, you can get Freelance, Harvard, or some other easy-to-use Windows presentation graphics package. But if you'll settle for a little less hand-holding, Bravo is a potent $79 alternative.

Most of the high-end packages copy Freelance for Windows' "click here" metaphor for entering text directly on screen; Bravo bucks the trend with an outline for writing or importing presentation text. With Bravo's slide view, which is WYSIWYG, you have access to an impressive collection of drawing tools, fill options, color palettes, and typographic controls. Select the text tool, for instance, and the tool bar changes to give you, among other things, buttons to interactively tighten or loosen letter spacing.

The Design menu provides access to 26 utilitarian master page designs. Once you've chosen an overall design, you pick an appropriate template (Title, Graph, Word Chart, and so on) for your page. You can spruce up your pages with smart clip art that maintains its proportions as you resize it. This sort of clip art is a good idea; unfortunately there's not nearly enough of it.

Bravo has nearly all the checklist features you'd expect from a top-flight presenter: flexible graphing, configurable speaker notes and handouts, a run-time player, and fully customizable 24-bit color for any object. The product falls down, however, by making many features hard to locate or tricky to use. But if you have the energy to learn Bravo, you're sure to impress your audience with your presentation skills—and the boss with your thriftiness.

—Steve Fox

Bravo

WINDOWS This $79 presentation graphics package has most of the high-end features the big names offer.
Alpha Software Corp.
800/451-1018,
617/229-2924
List price: $79
Reader service no. 656

	COMPANY	ADD1	CITY	TEL	HOURS
1	Macy's	Clifton Center, Wolf Rd.	Albany	555-3885	M,T,W 10-6; Th-Fr 10-9
2	Audio Lab	298 Congress St.	Troy	555-2860	M,T,W 10-6; Th-Fr 10-9
3	Radio Shack	110 Watervliet Ave.	Watervliet	555-1125	M,T,W 10-6; Th-Fr 10-9
4	Lechmere	89 Federal Way	Albany	555-7927	M,T,W 10-6; Th-Fr 10-9
5	Dalton's Audio	310 State Street	Albany	555-4500	M,T,W 10-6; Th-Fr 10-9
6	K-Mart	80 Washington St	Rensselaer	555-5091	M,T,W 10-6; Th-Fr 10-9
7	Hippo's	1500 Central Ave.	Albany	555-5538	M,T,W 10-6; Th-Fr 10-9
8	B.J.'s Wholesale	97 Third St	East Greenbush	555-1519	M,T,W 10-6; Th-Fr 10-9
9	Elmere	Village Plaza, Rt. 146	Schenectady	555-9047	M,T,W 10-6; Th-Fr 10-9
10	Ernest's Stereo	76 O'Brien Way	Loudonville	555-4230	M,T,W 10-6; Th-Fr 10-9
11	Caldor's	1423 Heath St.	Albany	555-1987	M,T,W 10-8; Th-Fr 10-9
12	Coco's	Northern Plaza, Rt. 152	Albany	555-2921	M,T,W 10-6; Th-Fr 10-9
13	Belton Stereos	150 State Street	Troy	555-1473	M,T,W 10-8; Th-Fr 10-9
14	Concord Audio	1999 Railroad Ave.	Albany	555-0200	M,T,W 10-6; Th-Fr 10-9
15	Radio Shack	872 Johnson St	Watervliet	555-0711	M,T,W 10-6; Th-Fr 10-9
16	K-Mart	89 Albany Street	Albany	555-2205	M,T,W 10-6; Th-Fr 10-9
17	Hippo's	45 Wadsworth Circle	Menands	555-6099	M,T,W 10-6; Th-Fr 10-9
18	Sam's Club	870 Central Ave.	Albany	555-3155	M,T,W 10-6; Th-Fr 10-9
19	Audio Lab II	1145 Lawler Ave.	Albany	555-8049	M,T,W 10-6; Th-Fr 10-9
20	Wilton Stereo	189 Central Ave	Albany	555-4995	M,T,W 10-6; Th-Fr 10-9
21	Caldor's	45 Branch St	Colonie	555-8606	M,T,W 10-6; Th-Fr 10-9
22	Rettig's Stereo	2764 Consort Rd.	Schenectady	555-8424	M,T,W 10-6; Th-Fr 10-9
23	Homer's	619 Crusty Way	Loudonville	555-1965	M,T,W 10-6; Th-Fr 10-9

Making sense of the amount of data
ing into your company is like trying to
from a fire hose. If the pressure doesn't
whelm you, the volume will.

Businesses need a better way to make
of all this data. A better way to correlate
think about it. To interpret it. To visual
To form a comprehensive picture of w
really means.

MapInfo desktop mapping is that
way. And it's easy to see why. All data ha
thing in common. Location. It all o
somewhere. And when you use Ma
solutions to link data together by loca
dynamic pictures of what your organiz
really looks like begin to appear.

Clear pictures of opportunities you've
missing. Pictures for sales, marketing,
tomer services. Pictures for operations
planning. Finally, every corner of your
nization can see exactly what all that da
been trying to tell them.

New insights for better, faster deci
New ways to use data as a compe

Think.

Prodea Synergy Automates Data Flow

Prodea Synergy gives managers the ability to automate repetitive tasks within an organization, working with any number of DOS, Windows, and even mainframe programs until it completes its task. The product stands out from the new visual programming tools because no programming ability is necessary. And while workflow automation software can route files to certain workers in a predefined order, Prodea Synergy automates a specific, recurring task—for example, generating monthly reports from a company database.

The product lets you visually design a "package," which is what its applications are called. You simply choose icons for different programs and place arrows between them to represent data flow. You then launch the resulting package by pressing a button. Synergy will take care of issues such as seeing that your data gets from point to point in the richest format and will even do a smart search for data over a local area network. It works with any standard messaging protocol, including OLE, MAPI, VIM and DDE, and can send keystrokes if that's all an application understands.

Prodea Synergy is designed to answer very specific information flow problems. You can use it to develop executive information systems, sales or manufacturing forecasting systems, or complex database analyses.

One company streamlined and simplified a performance review process once performed solely by its MIS department for top-tier customers; now the firm's salespeople use it for all the company's customers.

Using Prodea Synergy, salespeople click on the areas of interest to a customer. Once these are identified, Prodea Synergy goes to work, querying a local database, using the firm's custom communications software to query a database on a mainframe. Prodea Synergy then feeds the results into an Excel worksheet, combines that data with a Word for Windows document, and finally sends the combined information into Harvard Graphics presentation graphics software.

Prodea Synergy is a powerful tool that can integrate a variety of applications, fetch data across platforms, and automate complex but routine processes. It saves you time for the creative aspects of your job.

—Joe Abernathy

Prodea Synergy

WINDOWS A visual application-integration tool that can automate complex tasks.
Prodea
800/776-3321, 612/942-1000
List price: $495, $200 rebate for a limited time
Reader service no. 657

...on. To slash waste. To directly impact ...ottom line.
...l, MapInfo is completely open. Use data ...ever it is stored (Oracle, DB2, Sybase, ...s, dBase, Lotus 1-2-3, Excel and many ...rs). With our MapBasic Development ...ronment, you can easily integrate map- ...into your client/server applications, too. ...any desktop you want (Windows, ...ntosh, Sun, HP, DOS).
...of which will make it easy to confirm ...ething you've always known. But have ...r been able to see. Inside every fat data- ...are a thousand beautiful ★★★★½ ...s just trying to get out. ...Info is the key.

...ee for yourself. Send for our free ...apInfo desktop ...apping demo ...sk today. Just call ...800-327-8627.

Code: 02001

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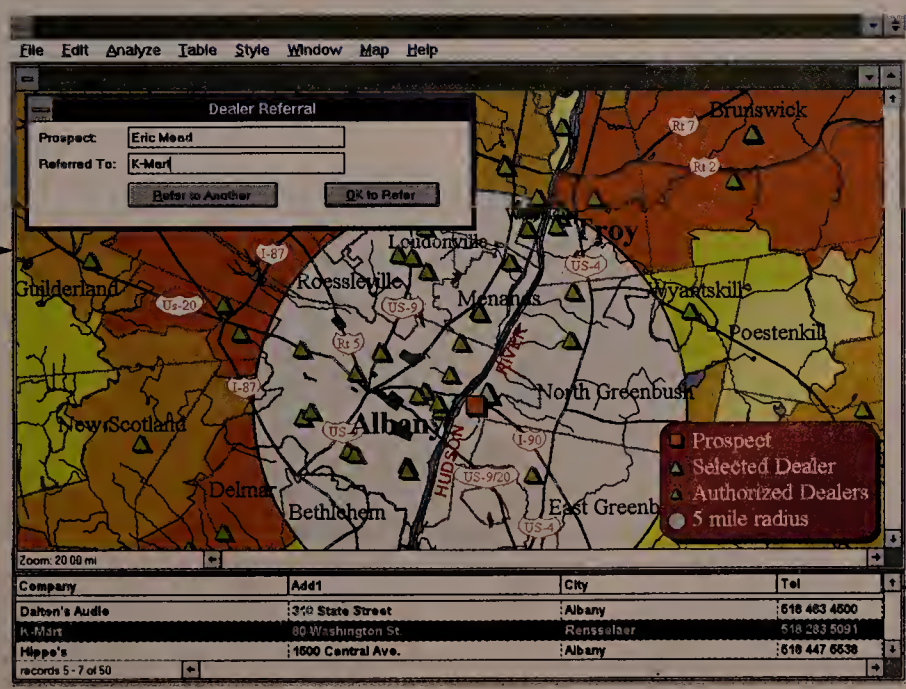
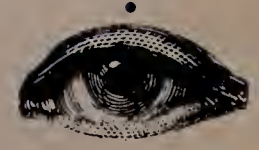
Visually.





By correlating information by location, MapInfo lets you think visually. And when you do, patterns, trends and relationships in customer services, sales, marketing and operations begin to emerge. Clear pictures of opportunities you've been missing appear right on the screen.

MapInfo® CORPORATION
The Standard in Desktop Mapping

Circle 129 on reader service card

Continued on page 119

Risk Forecasting Based on Spreadsheet Data

Crystal Ball Version 3.0

WINDOWS Factor risk forecasting into 1-2-3 and Excel 4.0 worksheets with this easy-to-use stat package.
Decisioneering Inc.
800/289-2550, 303/292-2291
List price: $295
Reader service no. 658

If you need more than gut feelings to predict your company's future but the thought of learning a statistics program makes you queasy, consider Decisioneering's latest upgrade to Crystal Ball version 3.0. This $295 add-in, available in versions for Excel 4.0 and Lotus 1-2-3 release 4.0, makes risk analysis accessible even to the statistically disinclined. The new version is a little more powerful, a little easier to use, and, for the first time, available to 1-2-3 users.

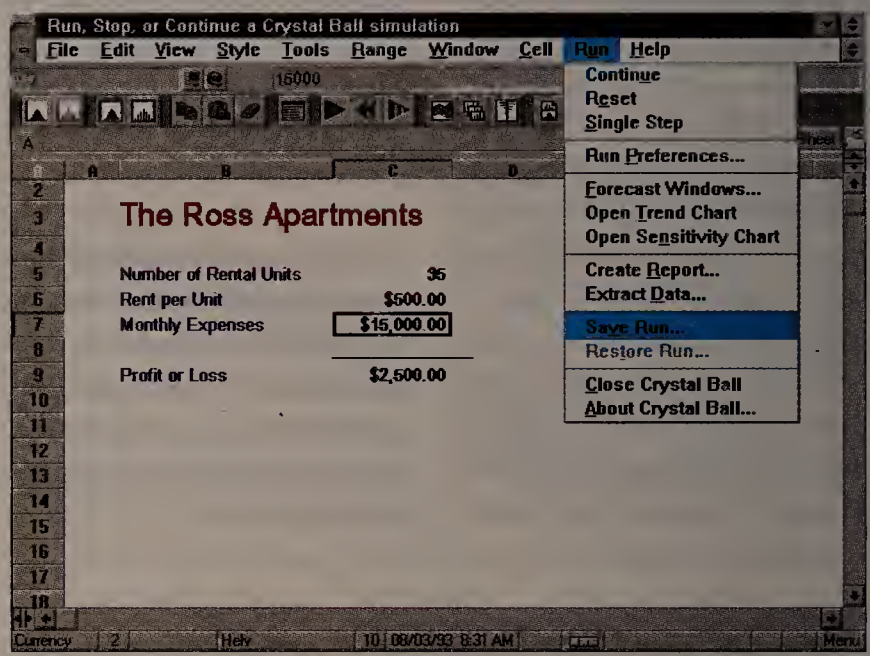
Like its predecessor, version 3.0 uses existing spreadsheet data to simulate possible scenarios, quantify risk and uncertainty, and determine the probability of each scenario occurring—feats spreadsheet and typical forecasting packages can't handle as easily.

To use this add-in, define a range of values for spreadsheet cells containing variables that you're uncertain of and from the 16 probability distributions, or statistical patterns, choose the one that best reflects your underlying assumptions about those values. For example, you know that your promotional budget for a particular product will fall between $200,000 and $400,000. You assume that the budget can't exceed $400,000; it won't be less than $200,000 because you've been guaranteed that much; and it should be about $350,000, based on historical data for similar products. In cases such as this, where you can estimate the minimum, maximum, and most likely values, you would select the program's triangular probability distribution. (The manual clearly explains which distributions to use when.) You can assign distinct distributions to the different variables in your spreadsheet.

After defining a distribution for the variables, you define the affected formulas and run a simulation. The program plugs random values from the defined range of variables into the formulas, recalculates the entire spreadsheet, and records the outcome. You can view the results in different ways. In the Bar Chart view, the larger bars represent the outcomes most likely to occur. A new Sensitivity Chart view shows which variables and assumptions have the most impact on a forecast model. Variables with the least impact can often be ignored, letting you focus your energy on those of greater importance.

New ease-of-use features in Crystal Ball include 19 SmartIcons that save keystrokes for 1-2-3 users as well as Save Run and Restore Run features that save and display completed forecast results without the need to rerun the simulations.

—Randy Ross



CRYSTAL BALL 3.0 includes a new Save Run command, which enables you to save completed forecast simulations.

Affordable Graphics and Desktop Publishing

The British are coming to the Windows graphics market. U.K.-based GST Software, the original developer of Timeworks' Publish-It, is offering its drawing and page-layout packages, 1st Design and 1st Press, at the low price of $69.95 each.

1st Press, 1st Design

Low-end DTP and drawing packages offer impressive functionality at a low price.
GST Software Products
800/236-1066, 703/560-2354
List price: $69.95 each
Reader service no. 659

Both programs pack impressive features in a handsome interface. 1st Press's icon tool bar and floating menus make creating frames, pouring text and graphics, and drawing lines and boxes easy. You can wrap text around objects, view facing pages, and create paragraph styles. The package comes with 150 pieces of clip art, 42 TrueType fonts, and 8 basic document templates.

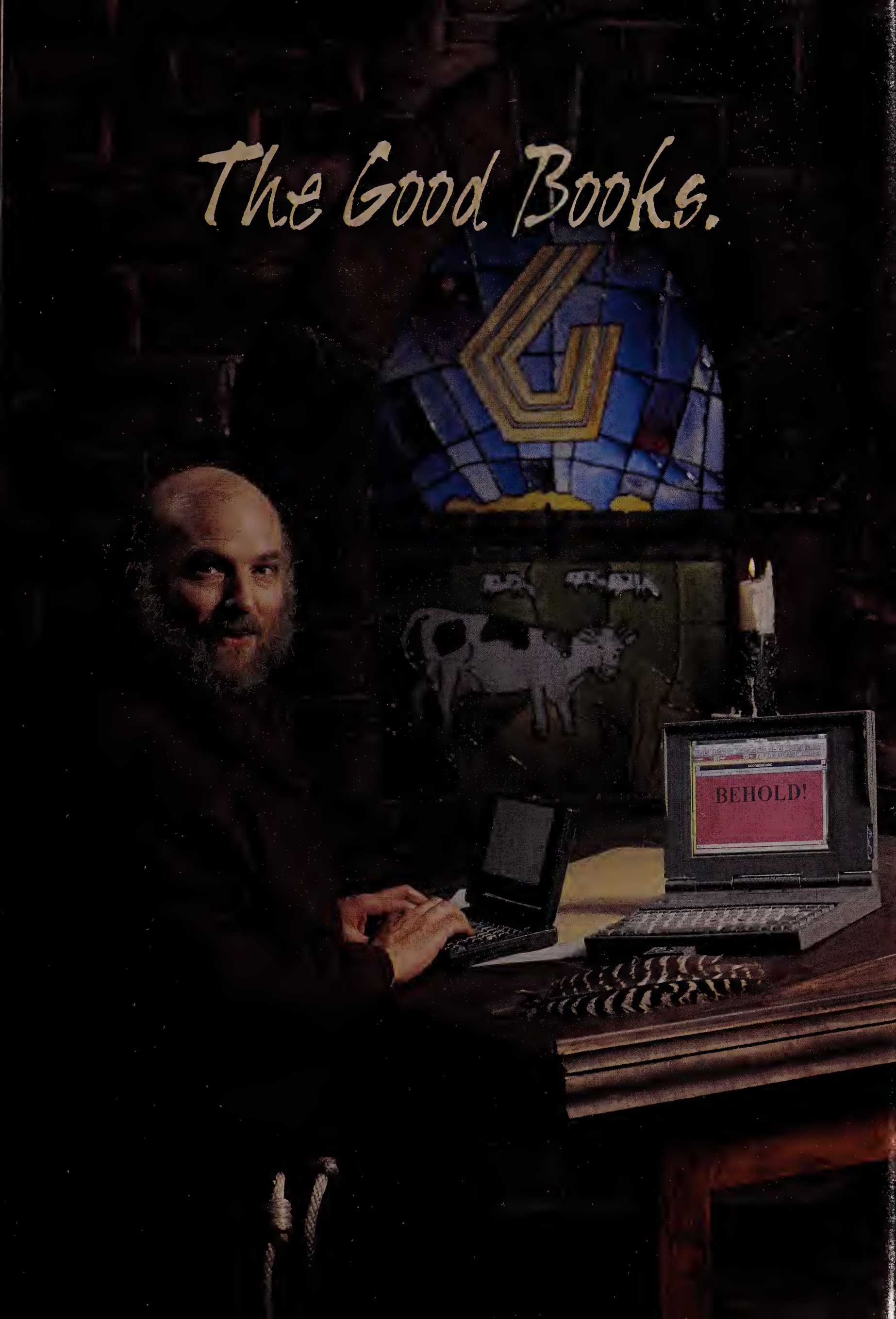
1st Design is a 24-bit drawing package featuring all the usual drawing shapes, plus the ability to create Bézier curves. You can edit text on screen; adjust letter, word, and line spacing; rotate and skew objects; create blends; and add shadows and 3-D effects. There's even a module for tracing imported bit maps. 1st Design includes 600 clip art images and 53 TrueType fonts.

Naturally, at these prices you can't get everything. 1st Press lacks a pasteboard for storing items, it has bare-bones typographical tools, and it won't automatically flow text between frames. 1st Design lacks layers and other precision tools, and neither program supports OLE. Still, if you need to whip out fliers, brochures, logos, or other simple documents on your home or office printer, these products will do the job.

—Daniel Tynan

Behold.

The Good Books.



The HandBook®

Size

The difference between a 3-pound portable and a 4-pound portable doesn't sound like very much until you lug one around for hours. Then every ounce counts! HandBook users sing the praises of the HandBook's size. It's big enough to be fully functional, but small enough to take anywhere effortlessly.

Battery

A 2.2Ah NiMH rechargeable battery comes with your HandBook. The battery lasts up to four hours with power management, about two hours without power management. You receive an AC adapter/charger that charges the battery pack separately or in the HandBook. The HandBook also has a convenient alkaline battery pack option which enables you to use over-the-counter double-A batteries, too.

Drive

The HandBook 486 includes an 80MB or 130MB hard drive for today's larger Windows programs and files. With the Interlink software utility and serial download cable provided, you can easily transfer data between the HandBook and other PCs.

Display

Looking at the HandBook's VGA display is easy on your eyes. It's the largest backlit display of any subnotebook in this world or the next, and you can use it comfortably in all lighting situations.

Suspend/Resume

Suspend/resume is one of the features HandBook users rejoice about! It allows you to stop work any time, leave all your Windows applications open, then resume instantly at exactly the same chapter and verse without losing anything or restarting the system. It's great for taking notes in meetings!

intel inside

The ColorBook

Dual-Scan STN Display

Dual-scan STN color is the latest technology in portable color displays. The incredible quality of the LCD coupled with local bus video gives you truly out-of-this-world graphics. You can display up to 256 colors with the ColorBook running in VGA mode.

Battery

You can have faith that your rechargeable battery will last up to four hours with power management, over two hours without power management. You also get an AC adapter/charger capable of fast-charging the battery separately or during operation in the ColorBook.

Suspend/Resume

Gateway 2000 HandBook users like suspend/resume so much we designed it into the ColorBook as well!

Drives

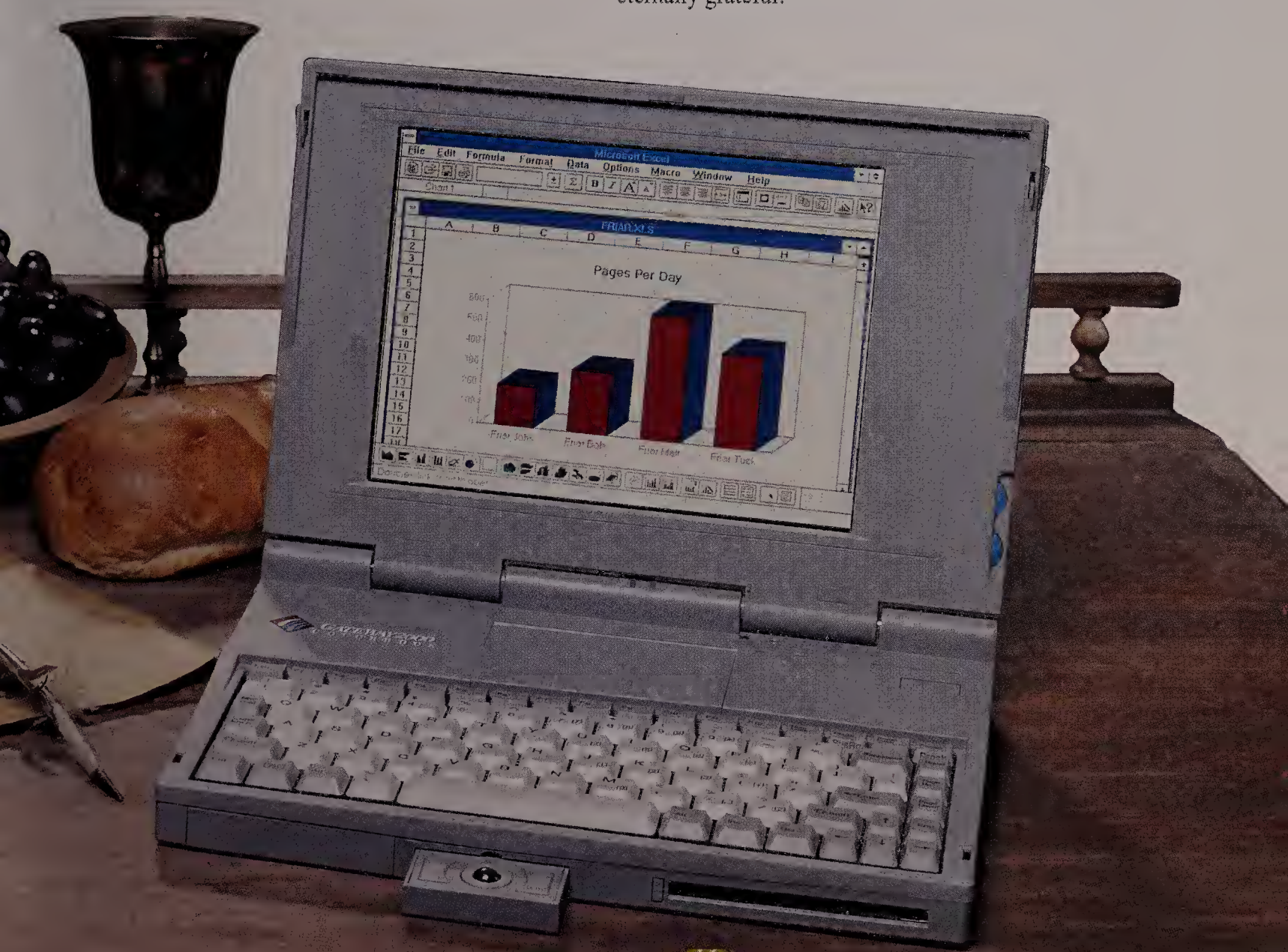
The ColorBook includes a floppy drive and a high-capacity hard drive. The hard drive is removable — a handy feature for companies where notebooks are checked out to multiple users. Upgrading to a larger drive in the future is also much easier with the ColorBook's removable hard drive.

External Ports

The ColorBook has parallel, serial, PS/2 and VGA ports. You can use it with an external mouse, keyboard and monitor. The ColorBook supports simultaneous video and allows you to display your ColorBook screen on an external monitor in up to 1024 x 768 resolution.

Your Calling

Surely one of these "good books" is a match made in heaven for your needs. Give us a call. We'll be eternally grateful!



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"You've got a friend in the business."

800-846-2030

The Gateway 2000 HandBook® And ColorBook Are Simply Divine!

If you're looking for the perfect portable PC for your next pilgrimage, look no further than the HandBook and ColorBook from Gateway 2000. One of these notebooks is the answer to your prayers.

The HandBook 486 is the next generation of the original HandBook, the product that was the genesis of an entirely new portable PC category dubbed "subnotebook" computers. The new product is blessed with many improvements while retaining all the things people love about the first model. With the HandBook 486, you get the smallest Windows™ PC in this world — and when using a 486DX2 processor, the HandBook is by far the most powerful PC of its size. New HandBook 486 models include SL Enhanced Intel486® CPUs and come with 4MB RAM (expandable to 20MB), 80 or 130MB hard drive, backlit VGA display, built-in pointing device, and one PCMCIA slot. All this and the HandBook 486 still weighs under three pounds, is smaller than the day planners many people carry, and starts at $1,495. Once you get your hands on a HandBook 486, you'll be a HandBook convert.

The ColorBook is the 486 color notebook that's priced the same as other companies' black-and-white models. With the ColorBook, you get bright, crisp color graphics from the dual- scan STN display. You get a small, easy-to-carry notebook. The ColorBook weighs less than 5.7 pounds and measures 11.7" x 8.5" x 1.77". It's one of the thinnest color products on the market. And, you get 486 performance. ColorBook models are based on SL Enhanced Intel486® processors, and include the virtues of a 1.44MB floppy drive, 4MB of RAM (upgradeable to 20MB), a large, fast hard drive, integrated track ball and two PCMCIA Type II card slots. All this starting at under $2,000. Heavenly!

Good Book Review

COLORBOOK 486SX-25

- Weight: Under 5.7 Lbs.
- Dimensions: 11.7" x 8.5" x 1.77"
- 25MHz SL Enhanced Intel® 486SX CPU
- 4MB RAM (expandable to 20MB)
- 3.5" 1.44MB Diskette Drive
- Removable 80MB IDE Hard Drive
- 9.4" VGA Dual-Scan STN Color Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 2 PCMCIA Type II (or 1 Type III) Slots
- Integrated Track Ball (2 Buttons)
- 85-Key Keyboard
- Parallel, Serial & PS/2® Ports
- External VGA Port
- MS-DOS 6® and Windows™ 3.1

$1995

COLORBOOK 486SX-33

- Weight: Under 5.7 Lbs.
- Dimensions: 11.7" x 8.5" x 1.77"
- 33MHz SL Enhanced Intel 486SX CPU
- 4MB RAM (expandable to 20MB)
- 3.5" 1.44MB Diskette Drive
- Removable 170MB IDE Hard Drive
- 9.4" VGA Dual-Scan STN Color Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 2 PCMCIA Type II (or 1 Type III) Slots
- Integrated Track Ball (2 Buttons)
- 85-Key Keyboard
- Parallel, Serial & PS/2 Ports
- External VGA Port
- MS-DOS 6 and Windows 3.1

$2395

COLORBOOK 486DX-33

- Weight: Under 5.7 Lbs.
- Dimensions: 11.7" x 8.5" x 1.77"
- 33MHz SL Enhanced Intel 486DX CPU
- 4MB RAM (expandable to 20MB)
- 3.5" 1.44MB Diskette Drive
- Removable 170MB IDE Hard Drive
- 9.4" VGA Dual-Scan STN Color Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 2 PCMCIA Type II (or 1 Type III) Slots
- Integrated Track Ball (2 Buttons)
- 85-Key Keyboard
- Parallel, Serial & PS/2 Ports
- External VGA Port
- MS-DOS 6 and Windows 3.1

$2695

HANDBOOK® 486SX-25

- Weight: 2.9 Lbs.
- Dimensions: 9.75" x 5.9" x 1.6"
- 25MHz SL Enhanced Intel 486SX CPU
- 4MB RAM (expandable to 20MB)
- 80MB IDE Hard Drive
- 7.9" Backlit VGA Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 1 PCMCIA Type II Slot
- Integrated Pointing Device
- 78-Key Keyboard
- Parallel, Serial & PS/2 Ports
- MS-DOS 6, Windows 3.1, Interlink and Serial Download Cable

$1495

HANDBOOK 486DX2-40

- Weight: 2.9 Lbs.
- Dimensions: 9.75" x 5.9" x 1.6"
- 40MHz SL Enhanced Intel 486DX2 CPU
- 4MB RAM (expandable to 20MB)
- 130MB IDE Hard Drive
- 7.9" Backlit VGA Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 1 PCMCIA Type II Slot
- Integrated Pointing Device
- 78-Key Keyboard
- Parallel, Serial & PS/2 Ports
- MS-DOS 6, Windows 3.1, Interlink and Serial Download Cable

$1995

OPTIONS

PCMCIA Cards:

- TelePath™ fax/modem — 14,400bps send-receive fax, 14,400bps modem. **$319**
- Fax/modem — 9,600bps send-receive fax with 2,400bps modem. **$199**
- Ethernet adapter. **$189**
- Token Ring adapter. **Call**
- HandBook VGA adapter. **$229**

Batteries:

- 2.2Ah NiMH batteries. **$89** each
- HandBook alkaline battery pack. **$29**

Floppy Drive:

- HandBook 3.5" 1.44MB external floppy drive. **$99**

Cases:

- Padded, soft-sided black cases custom-designed for ColorBook or HandBook. ColorBook **$49** HandBook **$55**

Extended VIP Warranty:

- 24-hour turnaround on factory warranty service for one year. Must be purchased at point of sale. Call for details. **$100**

4MB or 16MB RAM Upgrades:

- Due to the volatility of the DRAM market, please call for pricing.

HANDBOOK COMBOS

HandBook Traveler's Packs:

- Case, extra battery, alkaline battery pack & PCMCIA 96/24 fax/modem. **$379**
- Case, extra battery, alkaline battery pack & PCMCIA TelePath fax/modem. **$499**

HandBook Presenter's Pack:

- PCMCIA VGA adapter, Asymetrix® Compel & case. **$319**

COLORBOOK COMBOS

ColorBook Traveler's Packs:

- Case, extra battery & PCMCIA 96/24 fax/modem. **$329**
- Case, extra battery & PCMCIA TelePath fax/modem. **$449**

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Prices and configurations are subject to change without notice. Prices do not include shipping.

Continued from page 112

Two Better Ways to View and Manage Files

Drag And View 2.0, Drag And View Plus 2.0

Two shareware file-viewing programs let you see what's in your files without loading application programs.
Canyon Software
415/382-7999,
415/382-7998 (fax)
List price: Drag And View 2.0 $25, Plus $35
Reader service no. 660

Panoramic For Windows

WINDOWS This handy utility combines file viewing and conversion capabilities.
Cimmetry Systems Inc.
800/361-1904,
514/735-3219
List price: $129
Reader service no. 661

File viewers are helpful if you work with a variety of file types. Here are three worth considering. Drag And View 2.0, the latest version of Canyon Software's file viewer, lets you look at files created by popular word processors, databases, spreadsheets, and graphics programs without first firing up the apps. This $25 program lets you look at files in their native formats, or open multiple windows to compare files. You can search for specific text in any file, and even find a cell in a spreadsheet or a record in a database.

New features in version 2.0 include button bars for frequently used operations and a font choice dialog box for customizing file views. If you want to hear a WAV file (Windows sound file) and you have a sound driver installed in Windows, Drag And View can play it. And there's a new version of Fileman Launcher, a File Manager accessory that runs Drag And View whenever you run File Manager.

Using Drag And View is a breeze. Just drag the file from the File Manager to the Drag And View icon or to any open Drag And View window. Or click the View Files command in Fileman Launcher's menu in File Manager.

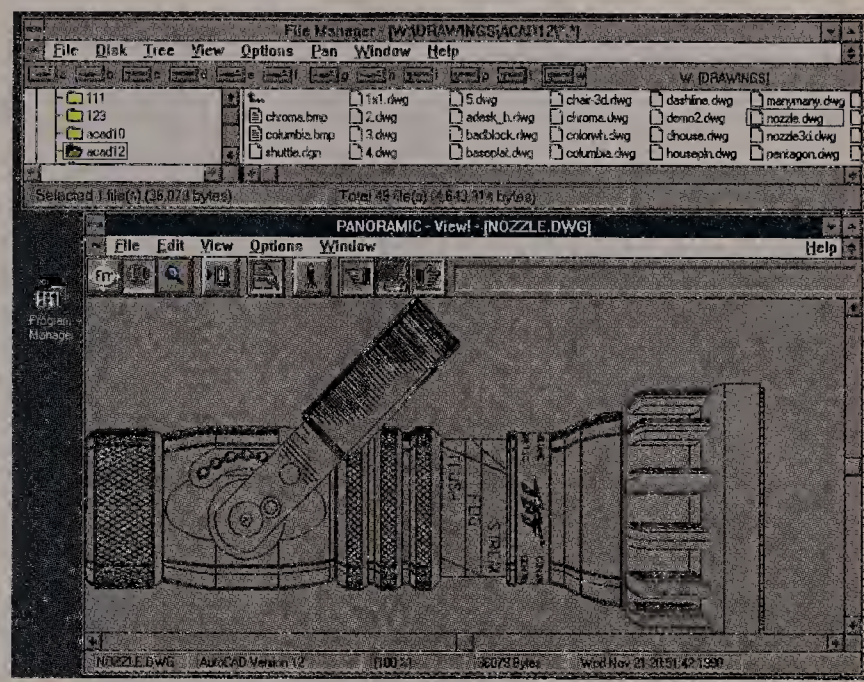
Drag And View Plus, a $35 enhanced version of Drag And View, lets you view vector graphic files.

Panoramic for Windows, like Drag And View, allows you to quickly and easily view one or more files without opening the applications that created those files. This $129 program offers comparable viewing features, plus some nice extras.

Select a file from the Windows File Manager, and Panoramic displays it in the adjacent window, exactly as it appears in your application. With Panoramic you can view archive, word processor, graphics, spreadsheet, database, and fax files, as well as files received over the network, even if you don't have the applications installed on your PC. Panoramic also conducts text searches easily and quickly.

Unlike other file viewing programs, Panoramic for Windows lets you quickly print or convert files to any of nearly 75 file formats without loading the associated applications. You can print files directly from the Windows File Manager; all you have to do is select the file to be printed and drag it onto a Panoramic Print icon. You can also select files for batch printing directly from the File Manager.

—Bronwyn Fryer



PANORAMIC FOR WINDOWS lets you view just about any file in a variety of ways. You can convert your files to one of 70-plus file formats.

Avery Puts Labels on Windows

The bane of business is label-making, because businesses label everything—envelopes, packages, file folders, floppy disks—and everything requires a different label. The Avery Division of label giant Avery Dennison claims it has simplified the tedious label-making job with LabelPro for Windows 1.0, a feature-rich program that supports every step of the process.

Whereas other label software programs only accept lists—of addresses, file folder titles, and so on—in ASCII or their own file format, LabelPro for Windows accepts lists from Word for Windows, Word, WordPerfect, WordPerfect for Windows, Paradox, Paradox for Windows, and dBASE. You can select part or all of a list from these programs, and LabelPro will format it in any one of more than 120 electronic label templates. From there you can create and add your own text or graphics with LabelPro's design tools, or import graphics in the PCX, TIFF, or BMP formats.

A shrink-to-fit option automatically fits text on each label, and the QuickSteps button guides you through tasks step by step. LabelPro for Windows works with laser, ink jet, or dot matrix printers, provided you have the label form required by your printer. The program supports business cards, index dividers, and transparencies.

—Shane Rau

LabelPro for Windows 1.0

WINDOWS A Windows interface and additional features make a tedious task more bearable.
Avery Division of Avery Dennison
800/252-8379,
909/869-7711
List price: $129.95
Reader service no. 662

The Norton Commander 4.0: A Great Toolbox

NORTON COMMANDER 4.0 FOR DOS packs a punch when you need serious file management, data compression, and graphics viewing.

If you wish you had all your utility programs for file and directory management, file compression and decompression, graphics viewing, and even text editing in one spot, version 4.0 of The Norton Commander may be what you're looking for. This release includes a raft of new and enhanced capabilities that simplify many tasks.

You have plenty of low-level power, control for advanced activities, and a friendlier DOS interface. The list of new features for version 4.0 is long. Copy, move, or delete entire directories in one swoop, including any subdirectories with files. Transfer files and/or directories from one system (with The Norton Commander installed) to another (that doesn't have to have The Norton Commander) by using the machines' serial or parallel ports. Search for specified text in Find File and get system and memory information with a point and click.

You also can use Norton Mail for MCI Mail sessions. Set up your account number, telephone and modem parameters, and address book. Prepare messages, log onto MCI Mail, and Norton Mail sends your messages and receives any mail waiting for you. I found the View function especially handy for looking at image files. No more fiddling with PC Paintbrush to view PCX and BMP files. Use the Tree function to select the directory and file, and click View.

Version 4.0 of The Norton Commander lists for $99. The main thing to remember is that you're not buying a single extraordinary feature. The considerable advantage of The Norton Commander is the sum of its parts: You get easy access to a broad selection of well-integrated tools and utilities.

—Gene Smarte

Norton Commander 4.0

Be more efficient in your DOS environment with this feature-rich DOS shell and utility program.
Symantec
800/441-7234, 408/252-3570, 408/255-3344 (fax)
List price: $99
Reader service no. 663

The Statistical Approach to Numbers Made Easy

SPSS 6.0 for Windows

WINDOWS This update to the Windows version of the powerful statistics package is suitable for statistics experts and novices.
SPSS Inc.
800/543-9262, 312/329-2400, 800/841-0064 (fax)
List price: $695
Reader service no. 664

T-tests, multivariate regressions, factor analysis—not really terms with which you're likely to lace daily conversation, unless you're the designated office stats guru. But as managers in all size companies gain access to more and more data, the ability to test assumptions and trends using even rudimentary statistical tools can be a competitive advantage.

Statistics software, unfortunately, isn't known for being user-friendly. Traditionally the domain of the MIS and the mainframe, statistics programs have been characterized by complex data structures, hard-to-use command languages, and unintuitive interfaces.

SPSS 6.0 for Windows changes all this. It combines extremely powerful statistical tools with an intuitive and easy-to-use Windows interface.

Long the doyen of statistical software in the mainframe world, SPSS's first Windows version, released about a year ago (see the August 1992 issue of *PC World*) brought a user-friendly graphical interface to its powerful statistical engine. Version 6.0 offers twice as many chart types and better compatibility with macros and files from other applications. It has 58 new statistical functions and four new optional add-in modules for advanced data handling and analysis. Like version 5.0, SPSS can directly import Excel, Lotus, SYLK, dBASE, and tab-delimited files, making it easy to analyze existing data. SPSS 6.0 is also fully compatible with files from cross-platform versions of SPSS, including UNIX and Macintosh.

How easy is SPSS to use? It still helps to have some idea what you're doing. Although the online help files are quite detailed, the dialog boxes for each statistical function assume that you know how each analytical approach works—and what variables need to be specified.

If you already have a working knowledge of statistics, SPSS is quite possibly the ideal combination of raw power, sophistication, and ease of use. If you don't think you'll be checking out the Peason Correlation Coefficients of your data anytime soon, but would still like to do more with your numbers than calculate the means, SPSS is probably the quickest and easiest path to take.

—Thomas Gewecke

Extraordinary Exo-Upgrade.

Upgrade To CA-Clipper® 5.2 For $299 And Get A Copy Of New CA-Clipper®/ExoSpace™ And Your Choice Of Another Product Absolutely FREE!

Break through the 640k barrier with the ultimate extended memory manager! Increase directly addressable memory from 640k to 16 megs.

Over 550 time-saving, problem-solving functions in one high-performance package. Raise your productivity with this valuable library.

Compile almost any dBASE IV application in three easy steps—and produce executable (.EXE) files with the efficiency of CA-Clipper.

dBASE apps come alive with new CA-dBFast 2.0—the first dBASE-compatible database and language for Windows.

Break Through The 640k Barrier With New CA-Clipper/ExoSpace!

CA-Clipper®/ExoSpace™ increases directly addressable memory by up to 2,500%—from 640k to 16 megabytes. Eliminate virtual memory swapping, greatly improve performance and run your Clipper applications in protected mode. Existing 5.2 users can get CA-Clipper/ExoSpace for only $99!

DBA readers rated CA-Clipper 5.01 Best Development Language, Best Xbase Compiler and Best Development Product.

CA-Clipper 5.2: The Complete, Professional Programming Environment.

CA-Clipper® 5.2 is a robust language, an efficient linker, a flexible preprocessor and a high-performance compiler. It includes: an editor, debugger and make utility for creating PC- and LAN-based applications.

PC Magazine Editor's Choice for Xbase Development.

DBMS Reader's Choice winner for client/server development system.

Feature	CA-Clipper	FoxPro	dBASE IV
Lexical Variable Scoping	YES	NO	NO
User-defined Commands	YES	NO	NO
Code Blocks	YES	NO	NO
Nested Multidimensional Arrays	YES	NO	NO
Predefined Object Classes	YES	NO	NO
Variables Modifiable in Debugger	YES	NO	NO
Customizable Reactive Error Handling	YES	NO	NO
Reads and Writes FoxPro (.CDX) Files	YES	YES	NO
Reads and Writes dBASE IV (.MDX) Files	YES	NO	YES
Reads and Writes Paradox (.DB/.PX) Files	YES	NO	NO

Comparison based on FoxPro Version 2.5 for DOS and dBASE IV Version 1.5.

New RDDs For FoxPro, Paradox and dBASE IV.

Replaceable database drivers for all the most popular development systems. Plus you can customize CA-Clipper with user-defined commands and functions. And seamlessly integrate modules from languages such as C, Assembly, dBASE and Pascal. There are no runtime fees, no additional licenses, no LanPaks.

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New CA-Clipper 5.2.

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Circle 39 on reader service card

Announcing specia
designed just for the

If you're one of the following people, your new 1994 DOS or Windows Quicken upgrade is now ready. Both new Quickens are so loaded with new time savings, new financial insight, and new power to organize — you'll think we redesigned it just for the unique way you personally use Quicken. For instance:

A You're too busy to read anything else in this ad.

You busy on-the-go types will love having Quicken organize your finances the way you organize all your other activities — with the new Quicken Financial Calendar.™ It remembers whom you pay, how much, when, how often — and makes the register entries for you automatically.

Whether the bill is a 36-payment car loan or a 360-payment mortgage, a twice-a-year property tax bill or your every-month phone bill — schedule it just once on the Financial Calendar, and you never have to enter it again. (You can confirm the amount each time if you wish.) And your regular deposits — weekly paychecks, monthly interest, whatever — are just as easy and convenient to handle automatically.

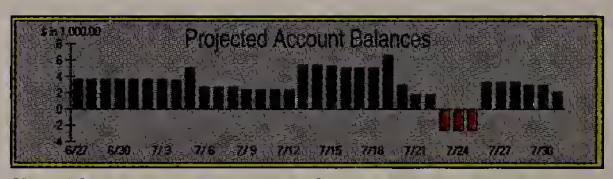
The Quicken Financial Calendar. It just may be the most radical planning-and-organizing tool since... well, the calendar.

B You just like knowing where your money goes.

New QuickReports are just for you. Zoom out from any individual transaction in a register to see instantly when you last paid that bill or get a list of all transactions for that payee or category. It's like getting an instant "mini-report" any time you need it.

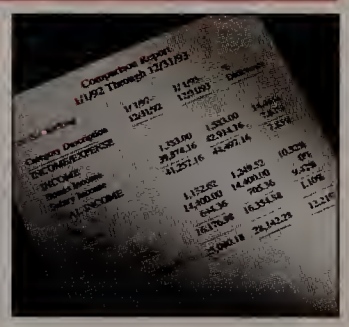
And for the first time ever, new Quicken 3 for Windows even forecasts your future. The new financial planning graph projects your account balances, cash flow and net worth for the next month — or up to the next two years — based on the transactions you've scheduled onto the Financial Calendar.

This could be the biggest breakthrough in Quicken ever! Just "drag and drop" transactions to the correct dates. Then let the new Quicken Financial Calendar make all your regular register entries for you automatically from now o Or, you can put any transaction on "total automatic" and never look at it again — or you can be prompted each time to confirm (or change) the amount. You can also make one-time register entries with the Financial Calendar.



Use this graph to play "What if..." and see the precise impact that decisions like saving more, vacationing sooner or even eating out less will have on your future account balances.

C You don't just organize —you analyze in detail.



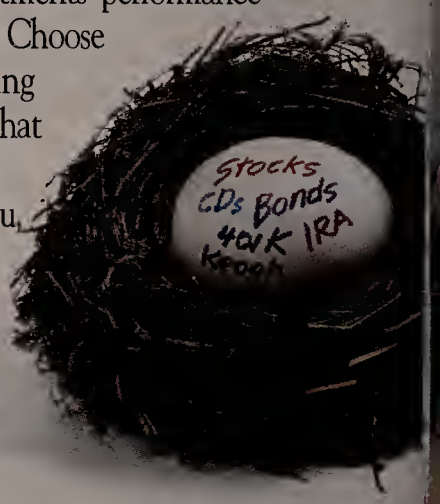
You can compare this year's income and expenses with last year's, or analyze your cash flow with percentage breakdowns. The new comparison report shows any two periods side by side — sorted by account, category, payee or class. And it gives the variance in dollars, as a percentage, or both.

You can also copy reports to the Windows™ clipboard in tab-delimited format, for easy import into your spreadsheet or other Windows applications.

D You plan to retire someday. (Or you're already retired.)

Now you can see better than ever exactly how your retirement fund and investments are doing.

The new investment portfolio view provides instant comprehensive analysis of your investments' performance and value. Choose the investing measures that mean the most to you, from at least 14 different options — including estimated income, ROI, percent yield, and much more



And now it's much easier to enter new investment activity, too. Just fill out the new onscreen investment activity form. It prompts you for the specific information relevant to virtually any investment transaction.

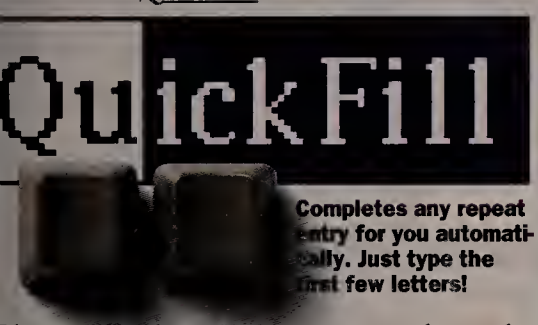
Quicken upgrades following people:

You love Quicken's speed and ease.

The new amount field calculator is radically ferent — and it's the most convenient screen calculator ever. Just type any equa- n (such as "2.75 + 4.95 x 1.08") directly o the Payment or Deposit column, and it ters the answer for you automatically. And the new date field calendar makes te entry easier than ever, with no typing. Plus: backup is automatic in Windows now well as DOS.

Your Quicken is more than two years old.

If you've been too busy to upgrade lately, u've been missing some very popular new tures. Like QuickFill™.



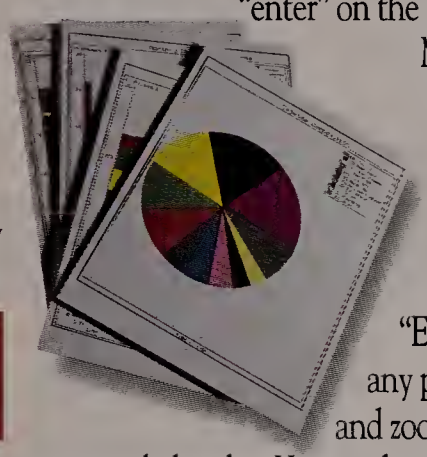
Plus IntelliCharge™ electronic credit card tements. And the innovations in ickZoom,™ financial reporting and invest- nt tracking we've mentioned all build literally hundreds of earlier new features and hancements. Like loan amortization, finan- l planning calculators and better links to tax ckages, to name just a few.

And learning new Quicken features is ier than ever, too — with new Qcards™ to de you step by easy step.

You don't (and won't) do Windows.

New Quicken 7 for DOS has its own y of doing just about everything we've mentioned for Windows, plus special features which DOS users in particular will appreciate. For starters, your graphs look better, work harder, and you can print them out, too.

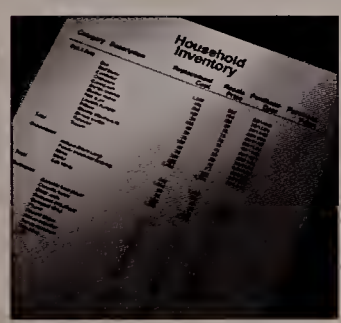
New QuickZoom for graphs shows the "numbers behind the pictures." So you can press "enter" on the graph of your May expenses, for example, and zoom to a pie chart breakdown on them. "Enter" again on any piece of that pie, and zoom to the transactions behind it. Yet another "Quicken easy" way to answer your questions fast!



To name just a few more items: Now you can save multiple budgets. And new Quicken 7 for DOS also remembers your last transaction so you can get to it in an instant. There's much more. We're as committed to DOS as you are.

You can never be too organized.

Windows users: Introducing new Quicken Companion™ 2 for Windows — featuring the new Quicken Home Inventory.™ It organizes all your household possession records in one place, in about an hour. Just scroll through the "reminder list" and click on "your" items, keeping or changing the average replacement values as you go. Now you've got a complete insurance coverage report to help you make informed insurance decisions, and provide solid claim backup, too.



Quicken Companion also estimates personal taxes, provides online stock and mutual fund pricing, and includes expert tips for getting the most out of Quicken.

If you upgrade to Quicken 3 for Windows, be sure to get Quicken Companion, too.

You like choosing from 3 special upgrade offers.

1. Get a $10 rebate on Quicken (and a $5 rebate on Companion) when you upgrade at your local store. Or . . .
2. Pay only $29.95* when you upgrade directly from Intuit. (Either way, your price should come out roughly the same.) Or . . .
3. Get both Quicken 3 and Companion 2 for Windows for just $49.95*. (This special offer only available when you upgrade directly from Intuit.)

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Special offers end 12/31/93 Ad Code: PWBAS

New Canadian editions of new Quicken 7 for DOS and Quicken 3 for Windows are shipped to all Canadian addresses. New Quicken 4 for Macintosh is available now! If you're not delighted with any Intuit product, simply return it within 60 days for a full refund. Quicken is a registered trademark and Quicken Companion, Financial Calendar, Quicken Home Inventory, QuickZoom, QuickFill, Qcard, and IntelliCharge are trademarks of Intuit. Windows is a trademark of Microsoft, Inc. DOS, Windows and Mac feature sets vary. Foreign shipping additional. ©Intuit 1993.

S System Requirements: 100% IBM® compatible PC with 640 RAM, DOS 3.0 or higher, and a hard disk drive. Graphs require graphics card. Guaranteed to work with your printer or monitor, or your money back. **dows System Requirements:** 100% IBM® compatible PC, 286 or higher (386 recommended), Windows 3.1, 2MB RAM and 5MB free on your hard disk. **Quicken Companion** requires additional 2MB free on your hard . Works with any printer or monitor supported by Windows 3.1. Quicken 7 for DOS and Quicken 3 for Windows are file compatible.

Replica Simplifies Document Exchange Between PCs and Macs

Like Adobe's Acrobat, Farallon's Replica offers an easy way to exchange documents between Macintoshes and Windows PCs without losing fonts, formatting, and graphics. Rather than convert a document to simple ASCII text for your colleagues, you can use Acrobat or Replica to retain the document's appearance—useful for heterogeneous networks. Both products are also handy for distributing eye-catching documents and business presentations to colleagues and clients.

Both Replica and Acrobat aspire to be *the* document exchange standard; however, Replica's goals are less ambitious. While Adobe plans to ship Acrobat versions for DOS and UNIX platforms, Farallon is content to keep Replica on Windows and Macs only. Also, Replica is simpler to install: Its Creator (for creating Replica documents) and Viewer (for viewing them) software ships on a single floppy disk. By comparison, Acrobat consists of four separate products—Reader, Exchange, Personal Distiller, and Network Distiller—each with a separate price tag. (For more information about Acrobat, see "Adobe Lets Style Travel With Text" in August's *Top of the News* section.)

One major drawback is that Replica can't embed PostScript fonts in documents but renders them as bit maps. This means the PostScript fonts in your original Mac document may not look the same on your Windows PC. However, Replica can embed TrueType fonts.

Create Replica Documents

You can use the included Creator software to make a copy of your original document in Replica's RPL format.

Let's say that you just put the final touches on a graphics-laden Word for Windows document. You want to distribute the document to your graphics department, which uses only Macs. First, choose *Print Setup* from the File menu, then click *Replica on File* as the target printer. Word for Windows will then "print" to Replica, which will automatically create a copy for distribution. Unfortunately, Replica for Macintosh wasn't available by press time, so we weren't able to test Replica's cross-platform abilities. However, the Mac version should be shipping by the time you read this.

One personal peeve: Changing the Print Setup box every time you want to use Replica (or Acrobat, which works similarly) can be a pain—ask anyone who's ever used a fax program. A simpler conversion process would allow you to drag a file from your open application to a Replica icon.

Replica Viewer

Creator is only half the story. The program's Viewer software lets you view documents created by other Replica users. While you can't edit these documents in Replica, you can copy portions of them, paste them into other applications, and edit them. To transfer a picture (as an object) to your drawing program, click the arrow icon, highlight the desired area, then move the image using Windows' clipboard. To move text to your word processor, use Replica's cursor tool. Additional tools let you cut bit-mapped images and paste them into paint programs.

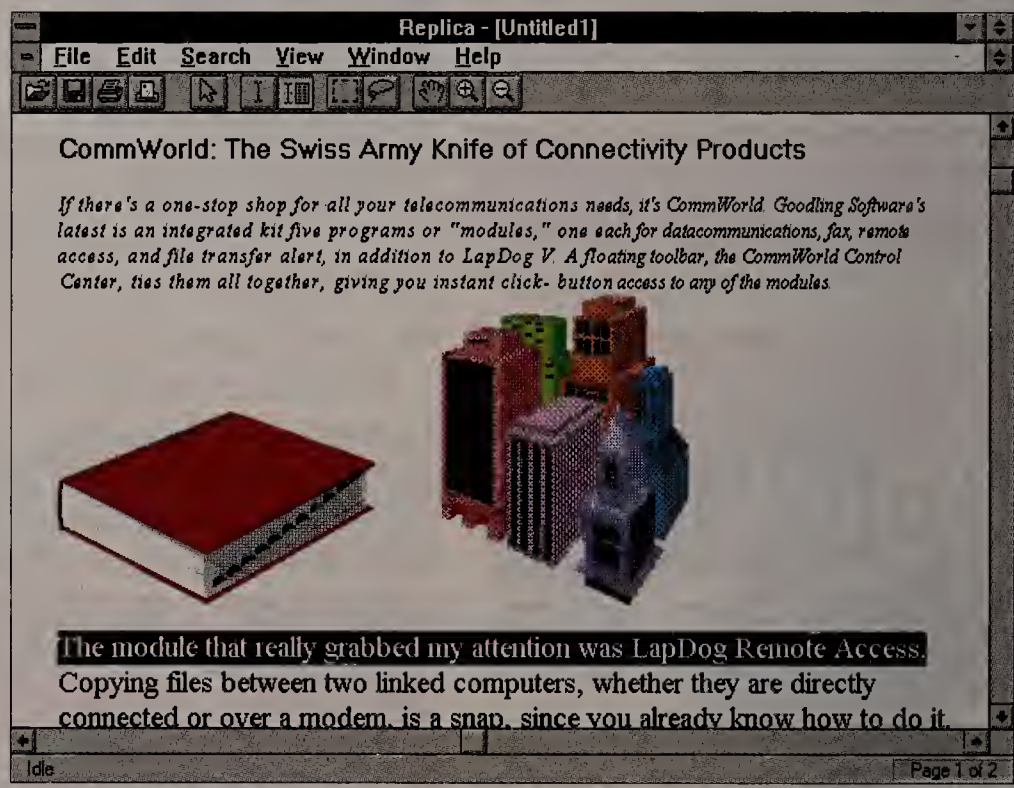
While Acrobat's Reader software costs from $35 to $50 per copy (depending on volume), you can distribute Replica Viewer to other users for free, according to Farallon. Farallon's licensing policies should make Replica attractive to businesses that distribute sales or promotional materials on floppy disk.

When you save a file using Creator, you can attach a copy of Viewer as well. (If you do this, the document's extension will be EXE rather than RPL.) Windows or Mac users who don't have Replica installed can then load your documents, and Viewer will automatically install itself on their systems.

From within Replica, you can launch E-mail programs such as Lotus cc:Mail or Microsoft Mail (or other VIM- or MAPI-compliant packages). When you click the Mail File icon, your E-mail package pops up; you then send the Replica file as a message attachment.

Replica is priced at $99; Replica ten-packs list for $749. If you want your documents to retain their original look and feel across platforms, Replica is worth a closer look.

—Jeff Bertolucci



REPLICA FOR WINDOWS lets you transfer a document between a Macintosh and a Windows PC and retain the document's formatting, graphics, and fonts.

Replica for Windows, Replica for Macintosh

You can share documents between Windows PCs and Macs while retaining the documents' fonts, graphics, and formatting.

Farallon
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510/814-5023 (fax)
Price: $99 single-user copy, $749 ten-pack
Reader service no. 665

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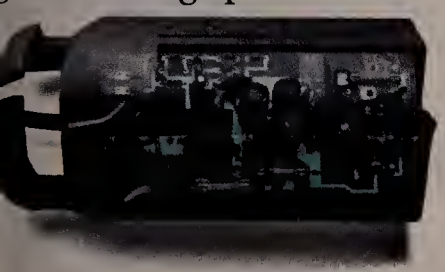

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Thomas W. Judd
President of Curtis Manufacturing

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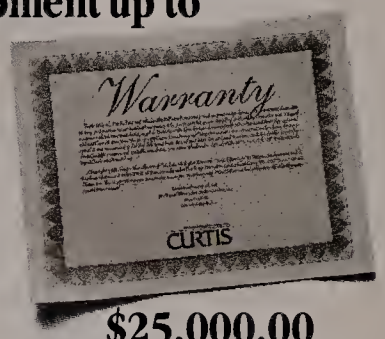

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Faster Wireless LANs from Proxim, Xircom

While still slower, costlier, and less reliable than wired networks, wireless LANs are making progress on all three fronts. Take the latest wireless products from Proxim and Xircom. These speedy products come in a variety of designs, including add-on boards, PCMCIA cards, and external models that plug into the parallel port.

RangeLAN2 is Proxim's second-generation wireless LAN. It has a data transfer rate of 1.6 mbps, several times faster than the original RangeLAN's 242 kbps. However, this is still significantly slower than the 10 mbps of wired ethernet LANs.

Both RangeLAN and RangeLAN2 use spread-spectrum radio to transmit data, but they broadcast over different frequencies and aren't compatible. RangeLAN2 transmits via the 2.4 GHz frequency, which offers more bandwidth (and faster performance) than the 902-MHz channel used by the original RangeLAN. Both products have a range of 300 to 500 feet in most offices, according to Proxim. RangeLAN2/PCMCIA lists at $695, while the RangeLAN2 lists at $595.

Meanwhile, Xircom debuts in the wireless LAN market with Netwave. Like RangeLAN2, Netwave uses the 2.4-GHz spread spectrum radio frequency but offers a somewhat slower 1 mbps data rate. Netwave lists for $499. Xircom's new Netwave Access Point for Ethernet is a $999 external adapter that links a Netwave LAN with a wired ethernet LAN.

—Jeff Bertolucci

XIRCOM MAKES ITS WIRELESS LAN DEBUT with Netwave, a family of cordless adapters that use spread-spectrum radio.

RangeLAN2, Netwave

New wireless LANs from Proxim and Xircom promise faster performance.
Xircom
800/438-4526,
818/878-7600
List price: Netwave $499, Netwave Access Point for Ethernet $999
Reader service no. 666
Proxim
800/229-1630,
415/960-1630
List price: RangeLAN2/PCMCIA $695, RangeLAN2/ISA $595
Reader service no. 667

Calera's Brainy Breakthrough OCR Package

Taking its inspiration from the human brain's ability to fill in the blanks using pattern recognition, Calera's WordScan Plus 2.0 provides improved character recognition for poor quality documents such as faxes and photocopies. The result is an efficient and more accurate OCR program. A button-based Windows interface and impressive integration with other applications have enhanced the product's usability.

While most OCR packages claim to offer 98 percent accuracy on original laser-printed pages, they have less success with faxed or photocopied documents, in which individual letters may appear split or joined to neighboring characters. Calera's new technology employs a neural network algorithm to decipher ambiguous characters. WordScan Plus analyzes not only the individual letters in question but the word as a whole to narrow the possibilities and searches for similar characters on the page to find the closest match. As a result, Calera claims that error correction has improved by as much as 35 percent, and the product's new 32-bit engine boosts total throughput time (from scanning to editing) by as much as 40 percent over the previous version of the package.

Calera's snazzy new Windows interface facilitates quick correction of the few errors left in your processed documents. Simply place your mouse over each button, and without even clicking, you'll get a one-line description in the lower left-hand corner of the page to explain that button's function.

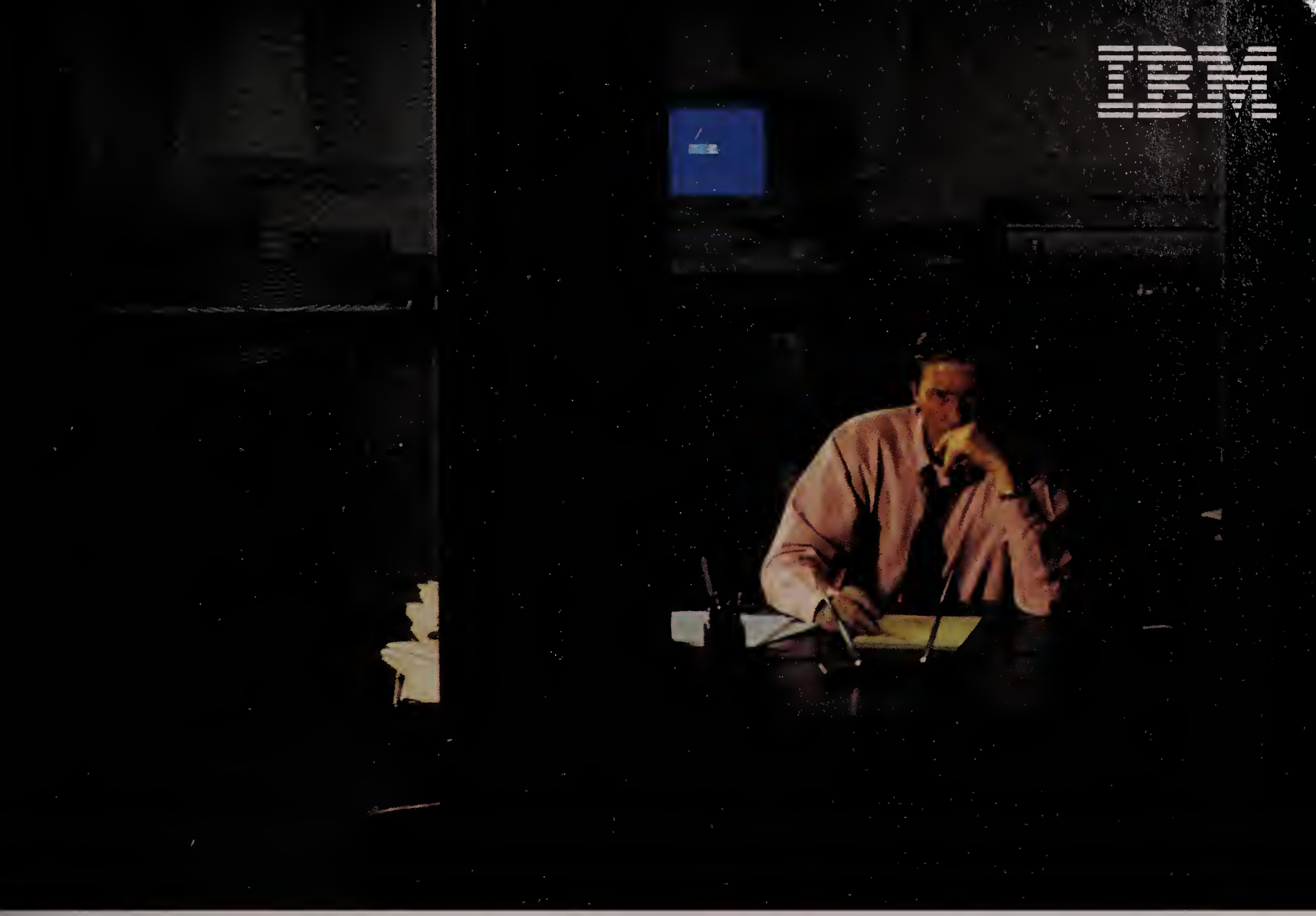
As with most OCR packages, you can access WordScan Plus from a list in the file menu of any Windows word processor you use. But Calera takes integration a step further by employing OLE 2.0 drag-and-drop, E-mail sending, and direct file input from fax. OLE 2.0 drag-and-drop works with the File Manager or from an OLE 2.0 fax product's log. You just drag any file from your fax log or File Manager over to the WordScan Plus icon to initiate the recognition process—a great time-saver.

Other nice touches include a 10,000 word dictionary and the ability to print an image directly from within WordScan Plus.

—Anita Hamilton

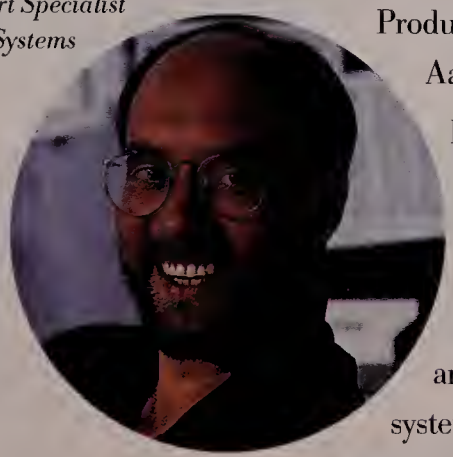
WordScan Plus 2.0

WINDOWS Superior OCR technology, button-based interface, Windows interoperability, and OLE 2.0 drag-and-drop.
Calera Recognition Systems
800/422-5372,
408/720-0999
List price: $695, upgrade $149
Reader service no. 668



There was a time when your worst technical nightmare wouldn't go away till the morning after.

Aaron Matas
Product Support Specialist
IBM Personal Systems
HelpCenter



IBM Personal Systems HelpCenter® Product Support Specialist Aaron Matas knows from personal experience that emergencies don't keep bankers' hours. That's why our HelpCenter stays staffed and ready around the clock. So if a system goes down, you won't have to wait till sometime the next day to find out if it's your hardware, software, or who knows what. After all, it's just common sense that the company who sold you the system should be there for you when you need them. Whatever your question, experts like Aaron are wide awake and ready to help you get back in business. Fast. It's all part of IBM HelpWare®.

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L-R: Alice Robinson, Gregg McGhee, Jeff Herman and Beverly Whitman, Custom Build Technicians, IBM Personal Computer Comp

425SX/Si

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ValuePoint SpaceSaver

- Compact size: 14.2" W x 4.8" H x 16.5" D
- 3 slots (includes 1 VESA Local Bus slot) and 3 bays
- Also available in medialess (no drives) configuration to function as an economical LAN client workstation

ValuePoint Desktop

- Plenty of room to grow: 5 slots (includes 1 VESA Local Bus slot), 5 bays
- A super combination of speed, power, upgradability and expandability

ValuePoint Mini-Tower

- Convenient, compact Mi Tower processor case me 9.5" W x 16.8" H x 16.9"
- Enormous room for grow 8 slots (includes 1 VESA Bus slot), 6 bays
- Perfect format for high-p computing (CAD/CAM, graphics, multimedia, et as a low-cost network ser

ValuePoint Si – NEW!

- Newest entry-level member of the ValuePoint family
- Compact size: 14.2" W x 4.8" H x 16.5" D
- VESA Local Bus Video
- 3 slots and 3 bays
- Choice of IBM Keyboard (Basic†† or Enhanced)
- A great, low-cost network client
- IBM HelpWare service and support

425SX/S

433DX/D

466DX2/T

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It starts – but doesn't end – with our hot-selling IBM ValuePoint™ PCs. Take a closer look at the systems shown here. Super PCs. Super prices. But if you don't see the system you want, call us. We'll build your PCs to your specifications – and your budget. We'll even preinstall selected software.

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- Intel® i486™ processors
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- 101-key IBM Enhanced Keyboard and IBM Mouse
- Zero Insertion Force (ZIF) socket for fast, easy processor upgrades
- A 32-bit VESA Local Bus slot for local bus speed on SCSI drives and other peripherals
- IBM HelpWare

intel inside

	ValuePoint Si – NEW!	ValuePoint SpaceSaver	ValuePoint Desktop	ValuePoint Mini-Tower
Features	425SX/Si	425SX/S	425SX/D	433DX/T
Processor	i486SX/25MHz	i486SX/25 MHz	i486SX/25 MHz	i486DX/33 MHz
Hard Drive/Memory	120MB/4MB	120MB/4MB	120MB/4MB	340MB/4MB
Drive(s)	3.5"	3.5"	3.5"	3.5"
Monitor	IBM 14V 14" SVGA NI	IBM 14V 14" SVGA NI	IBM 14V 14" SVGA NI	IBM 14V 14" SVGA NI
Operating System	IBM DOS & WINDOWS™	IBM DOS & WINDOWS	IBM DOS & WINDOWS	IBM DOS & WINDOWS
rice*/ IBM Credit Lease**	**$1,539** / $56 per month	**$1,649** / $60 per month	**$1,709** / $62 per month	**$2,489** / $90 per month
Features	425SX/Si	433SX/S	433DX/D	466DX2/T
Processor	i486SX/25 MHz	i486SX/33 MHz	i486DX/33 MHz	i486DX2/66 MHz
Hard Drive/Memory	212MB/4MB	120MB/4MB	120MB/4MB	527MB/4MB
Drive(s)	3.5"	3.5"	3.5"	3.5"
Monitor	IBM 14V 14" SVGA NI	IBM 14V 14" SVGA NI	IBM 14V 14" SVGA NI	IBM 15V 15" SVGA FS NI
Operating System	IBM DOS & WINDOWS	IBM DOS & WINDOWS	IBM DOS & WINDOWS	IBM DOS & WINDOWS
rice*/ IBM Credit Lease**	**$1,699** / $61 per month	**$1,789** / $65 per month	**$2,059** / $75 per month	**$3,399** / $123 per month
Features	433DX/Si	433DX/S	466DX2/D	466DX2/T
Processor	i486DX/33 MHz	i486DX/33 MHz	i486DX2/66 MHz	i486DX2/66 MHz
Hard Drive/Memory	212MB/4MB	245MB/8MB	245MB/4MB	527MB/8MB
Drive(s)	3.5"	3.5"	3.5"	3.5"
Monitor	IBM 14V 14" SVGA NI	IBM 14V 14" SVGA NI	IBM 15V 15" SVGA FS NI	IBM 15V 15" SVGA FS NI
Operating System	IBM DOS & WINDOWS	OS/2®	IBM DOS & WINDOWS	OS/2
rice*/ IBM Credit Lease**	**$2,049** / $74 per month	**$2,359** / $85 per month	**$2,729** / $98 per month	**$3,589** / $129 per month

oint Si systems do not include all features listed above chart. Please refer to product details listed at left, or more information. ValuePoint Si prices listed reflect IBM Basic Keyboard only. IBM Enhanced Keyboard e at additional cost.

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8am-midnight M-F, EST
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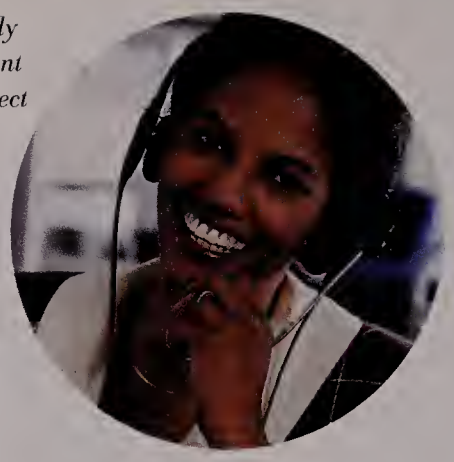
Angela Hardy
PC Consultant
IBM PC Direct



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Reader service no. 669

Bernoulli Drives Faster, Cheaper

Iomega has slashed prices and dramatically improved the performance of its top-of-the-line MultiDisk 150 drives with the addition of a 256K read/write cache. While retaining an average access time of 18ms, these drives now operate three times faster on save operations, the company says. All MultiDisk 150 drives now include a free Bernoulli cartridge as well, a $119 value at the new pricing level, which reduced the cost of drives and media roughly by half. The warranty was doubled to two years. Bernoulli drives work with nearly every SCSI interface and operate like a regular hard drive, except that the media is removable. The Bernoulli MultiDisk 150 handles disks with capacities of 35MB, 65MB, 105MB, or 150MB. It also can read and write 90MB cartridges, and read 44MB cartridges. The MultiDisk Transportable 150 is a semiportable version of the unit. Disk-doubling software is now available for Bernoulli from Stac Electronics. With the proper interface, the units work with a Macintosh or PS/2, and OS/2 is supported. The Bernoulli MultiDisk Insider 150 SCSI is priced at $599, down from $1099; the Transportable 150 is $699, down from $1225. Iomega Corp., 800/456-5522, 801/778-1000.

Reader service no. 670

In Focus PanelBook 450

For demanding presenters with one eye on the screen and one on the budget, In Focus's new color LCD panel should prove an enticing road machine. At 6 pounds and 9½ by 2 by 11 inches, PanelBook fits in a laptop bag or attache case. And though it has a passive (rather than active-matrix) display, its output is crisp and its response time is sprightly enough to handle 15-frames-per-second Video for Windows animations. The PanelBook 450, which has a programmable remote control device, supports only 640 by 480 resolution—a compromise the $3299 price tag makes palatable. In Focus Systems Inc., 800/294-6400, 503/692-4968.

Reader service no. 671

Panasonic KX-P1150

Panasonic believes there's still a market for inexpensive dot matrix printers—that's why its new KX-P1150 lists for just $169.95. Though the KX-P1150 targets students and home users, it would also make a fine personal printer for draft output in the office. Its nine-pin printhead produces near letter quality (NLQ) output. You get three draft fonts and four NLQ fonts. In draft mode, the KX-P1150 produces up to 240 characters per second (cps); in NLQ mode, it's limited to 38 cps. It comes with drivers for Windows 3.1. Panasonic Communications and Systems, 800/742-8086, 201/348-7000.

Reader service no. 672

KISS YOUR AC ADAPTER GOOD-BYE with Microcom's TravelPorte, an 8-ounce fax-modem that draws power from your PC's serial port.

BusinessWorks 8.0

Windows apps control the market in just about every product category—except accounting, where demand for DOS packages remains strong. Case in point: Manzanita Software has released version 8.0 of BusinessWorks, its highly rated DOS accounting software for small and medium-size businesses. Version 8.0 features a host of enhancements, including improved tracking of customers, vendors, budgets, and accounts and better reporting and printing capabilities. BusinessWorks users can now maintain 24 months of transaction history in all modules except payroll. (The prior version supported only 12 months.) Work-in-Progress reports have been added to the Job Cost module, and the Payroll module now supports electronic payroll deposits into employee bank accounts. Version 8.0 modules cost $395 each (up from $295); the System Manager module is $95. Other pricing options are available. Manzanita Software, 800/447-5700, 916/781-3814 (fax).

Reader service no. 673

CompressMate

Large spreadsheet files can devour your hard drive space quickly. But thanks to Intex Solutions' new CompressMate utility, there's a low-cost fix for this problem. CompressMate squeezes any Windows or DOS spreadsheet file by an average ratio of 10:1—much higher than the 2:1 ratio of disk compression

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Conversions Plus for Windows

If you're a Windows user who works with Macintosh word processor files, Conversions Plus for Windows can make your life easier. This utility translates a Mac word processor document into Windows format and retains its formatting attributes, including headers and footers. To translate a file, you load Conversions Plus and then place a Mac disk in your PC's 3½-inch floppy drive. Conversions Plus recognizes the document's format (MacWrite, for example); asks you to choose from a list of PC word processor formats, including Ami Pro, Word for Windows, and WordPerfect; and translates the document. Conversions Plus can also translate one PC word processor format to another—say, Ami Pro to WordPerfect. It's priced at $149. DataViz, 800/733-0030, 203/268-0030.

Reader service no. 677

FileRunner for Windows

FileRunner, the popular file synchronization program, now comes in a Windows version. Do you have to track files across multiple computers? If you're working on the same document at the office and at home, you need to make sure you're editing the most current version. With FileRunner for Windows, you specify critical files that must be updated—all DOC files, for instance. FileRunner then saves these files on a floppy, which you carry between your two (or more) PCs. Before you begin work, insert the FileRunner disk and click on the program's Windows icon. FileRunner checks the files' time and date stamps. If a file version on the PC is more current, FileRunner updates the disk version, and vice versa. The program includes data compression, allowing 3MB to 4MB of data to fit on a high-density floppy disk. FileRunner for Windows also scans each file for viruses. It costs $99.95. MBS Technologies, 800/860-8700, 412/941-9076.

Reader service no. 678

Paradox 4.5 for DOS

If you have a lot of business applications invested in DOS-based Paradox, Paradox 4.5 for DOS provides significant enhancements to version 4.0. The new version makes it easier for developers to improve existing programs and write new ones. For end users, the product takes greater advantage of the mouse and offers easier directory management, including tree-style directory browsing and some refinements in the report generator. For developers, there's an all-new state-of-the-art debugger, and the PAL language has been updated to include many new events and triggers. There are also more informational commands to help you determine system resources such as memory status, drive availability, and network environment. Paradox 4.5 for DOS is $795; upgrades are $99.95 for 4.0 users and $149.95 for users of any other Borland product. Borland Int'l, 800/331-0877, 408/461-9000.

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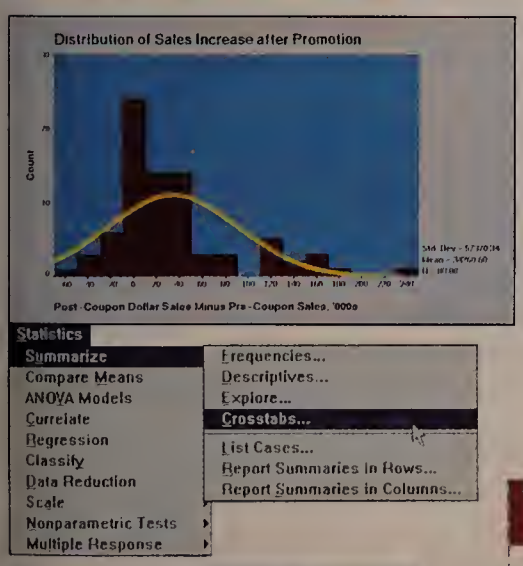

In-Depth Statistics

"For more statistical analysis tools than you'll get from a spreadsheet such as Excel, without the steep learning curve, SPSS for Windows is a great buy."– Michael Burgard, PC/Computing. Use correlations, crosstabs, regression and more. You won't outgrow this package.

Learn fast, work fast

SPSS 6.0 for Windows is the easy-to-learn, easy-to-use data analysis program that helps you do your analysis quickly and efficiently. Analytical options are clearly displayed in simple, yet complete, menus and dialog boxes. With a program this easy to use, you concentrate on the analysis, not the mechanics.

Work your data over

SPSS 6.0 for Windows makes the most of your existing data with the ability to directly read a variety of file formats like Excel™ and dBASE.® And with support for SQL and Microsoft's® new standard, Open Database Connectivity (ODBC), you'll have expanded access to a wide range of databases and applications.

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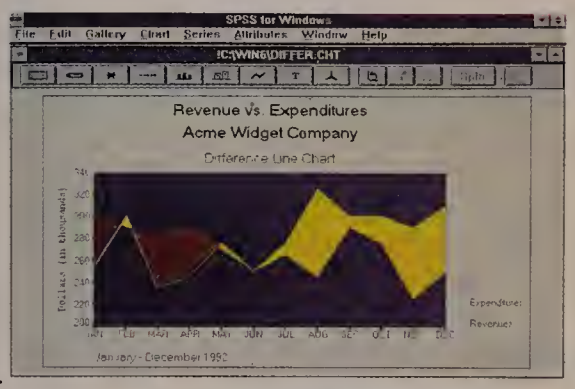
The statistical capabilities of SPSS 6.0 for Windows take you beyond simple sums and percentages. Investigate your data using a complete set of analytical options, including frequencies, crosstabulations, regression and more. See back for details.



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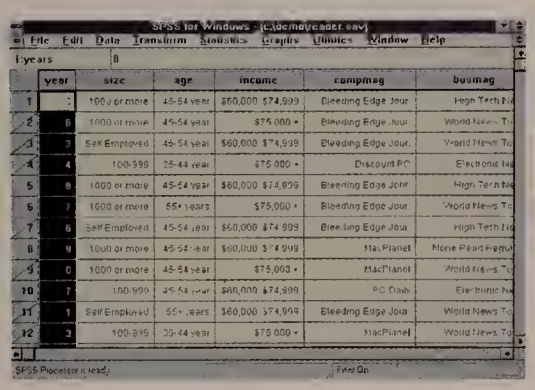

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"Stumbling blocks to statistical analysis are eliminated with SPSS for Windows. You don't have to be a programmer to use it and you don't have to be a statistician to understand it."– Richard O'Reilly, Los Angeles Times. The 100% Windows interface makes doing analysis simple. Hypertext help and an on-line glossary of statistical terms are just a click away.

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Key Features In SPSS For Windows

Features in red are new to SPSS 6.0 for Windows.

Easy to Learn, Easy to Use

- Easy-to-understand menus and dialog boxes
- Open several windows of different types at once

Create presentation-quality reports

- **Control page layout, use smart title and break wrapping**
- Control summary stats in output
- **Dialog boxes for summaries in columns and other enhancements**

Customize the program

- Determine the amount of virtual memory allocated to SPSS
- Type your own production mode commands
- Make macros for customized tasks
- Refer to on-screen glossary for explanations of statistical terms
- "Undo" an accidental action
- Data and graphics sharing through Dynamic Data Exchange and Object Linking and Embedding
- **Print charts in unattended production mode from command line**
- **Customize your menus to integrate programs in C or FORTRAN and macros from third-party applications with new programming interface tools**

Data Management with Direct Data Editing

- Handle large data sets with an essentially unlimited number of cases and variables
- Sample, sort, rank, count and weight cases
- Add, aggregate, merge, update, split, transpose files
- Increase analytical power through programming functions
- Define multiple missing values
- Perform SQL queries on relational databases via dialog boxes
- Transfer data between SPSS/PC+, SPSS Portable, Excel, Lotus, dBASE, SAS transport, ASCII (tab-delimited), SYLK, Oracle and SQL Server
- **More access to databases and applications with Open Database Connectivity (ODBC)**
- **Reduce amount of SORT workspace needed by up to 87%. The larger the data set, the greater the performance improvements**

Data Editor provides constant data access and editing capabilities

- Enter data directly in an easy-to-use spreadsheet format
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- Double-click on a variable to display all its information
- Save all characteristics of a variable definition in a template
- **Current case selections highlighted**

In-Depth Statistical Capabilities in a Logical, Smooth Design

Summarize – descriptive stats, group breakdowns, measures of association

- Frequency counts and tables, descriptive stats, exploratory data analysis, crosstabulations, means for groups, case listings

Compare Means – testing hypotheses about group means

- Independent-, paired- sample t-test
- One-way and simple factorial analysis of variance and covariance

Correlate – measures of association among variables

- Bivariate and partial correlations

Regression – linear regression using weighted or unweighted least squares

- Several methods for variable entry and removal
- Analysis of residuals and influential points

Multiple response – summaries for data in which questions can have more than one answer

- Frequency counts and tables, crosstabulations

Non-parametric tests – analyses which require very limited assumptions about the data

- One-sample tests
- Tests for K-independent and K-related samples

Diagnostic and exploratory statistics – basic analytical graphs

- **Autocorrelation and partial auto correlation function plots, curve fitting, case-plots and more**

Improved data transformations

- **Functions using neighboring observations for smoothing, averaging, and differencing, fast Fourier transformations and its inverse**
- **Interpolate values for missing data**
- **Statistical functions – 58 new fundamental transformations like cumulative distributions, inverse cumulative distributions and random number functions**

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- Produce charts of statistical results automatically or use like a stand-alone graphics package
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- **Print entire chart carousel or selected charts only**

Chart Editor – provides powerful tools for customizing charts

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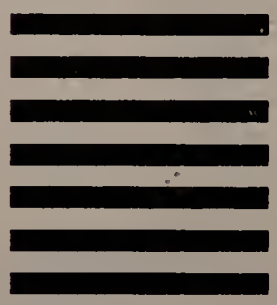

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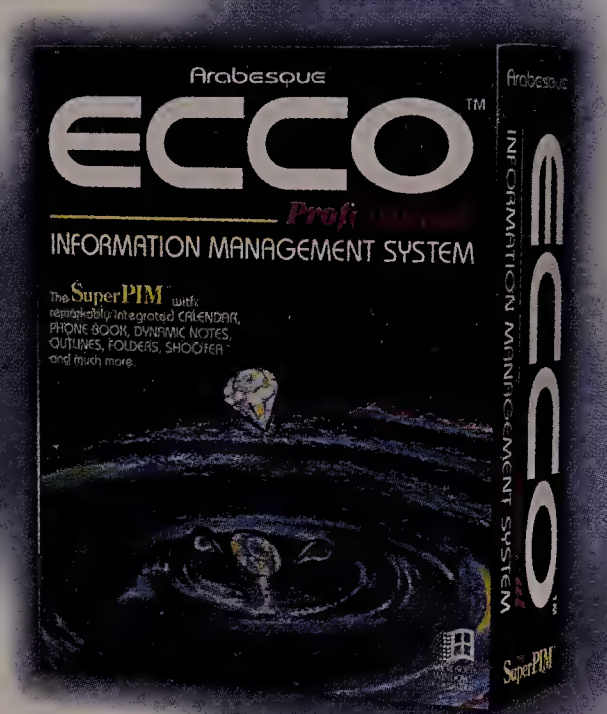

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SLIMLINE (3x3)

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Memory	☐4MB ☐8MB ☐16MB ☐Other___MB
Hard disk	☐120MB ☐170MB ☐240MB ☐340MB

DESKTOP (5x5)

Processor	☐486 Blue Lightning, 66 MHz ☐486DX2, 66 MHz
Memory	☐4MB ☐8MB ☐16MB ☐32MB ☐64MB
Hard disk	☐170MB ☐240MB ☐340MB ☐440MB

MINITOWER (8x6)

Processor	☐486 Blue Lightning, 66 MHz ☐486DX2, 66 MHz
Memory	☐4MB ☐8MB ☐16MB ☐32MB ☐64MB
Hard disk	☐170MB ☐240MB ☐340MB ☐440MB

EISA DESKTOP (8x6)

Processor	☐486DX2, 66 MHz ☐Pentium, 60 MHz
Memory	☐8MB ☐16MB ☐32MB ☐64MB
Hard disk	☐170MB ☐240MB ☐340MB ☐440MB ☐540MB SCSI-2*

EISA TOWER (8x12)

Processor	☐486DX2, 66 MHz ☐Pentium, 60 MHz
Memory	☐8MB ☐16MB ☐32MB ☐64MB ☐Other ____MB
Hard disk	☐170MB ☐240MB ☐340MB ☐440MB ☐540MB SCSI-2

*Not available with 486DX2, 66 MHz processor.

MONITORS

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15-inch	☐AMBRA Flat Square Tube ☐NEC Multisync 4FGE
17-inch	☐AMBRA Flat Square Tube ☐NEC Multisync 5FG
21-inch	☐NEC Multisync 6FG

OPTIONS

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Modems	☐Data/Fax internal ☐2400 bps internal
Tape backup drive	☐120MB internal/external ☐250MB internal/external
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Printers & scanners	☐IBM Personal Printer II (24-pin) ☐IBM LaserPrinter 4039 (12 ppm) ☐IBM LaserPrinter 4029 (10 ppm, 6 ppm) ☐Calera WS Complete PC Scanner

SOFTWARE

Word processing	☐Lotus Ami Pro ☐Microsoft Word® ☐WordPerfect
Accounting	☐Quicken
Spreadsheet	☐Microsoft Excel® ☐Lotus 1-2-3 ☐Quattro Pro
Graphics/ presentation	☐Lotus Freelance Graphics ☐Microsoft PowerPoint®
Comm/fax	☐WinFax Pro

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- 486SLC2, 50 MHz
- 4MB RAM max: 16MB
- 64KB processor cache
- 3.5" 1.44MB diskette drive
- 120MB (19ms) hard disk
- 3 16-bit ISA slots
- Windows™ accelerator with 1MB video memory
- 14" VGA Color Monitor
- Slimline casing (3 x 3)
- MS-DOS® 6.0, Windows 3.1, mouse

$ 1,179

- 486DX, 33 MHz
- 4MB RAM max: 36MB
- 128KB processor cache
- 3.5" 1.44MB diskette drive
- 170MB (17ms) hard disk
- 2 VESA local bus slots
- Windows™ accelerator with 1MB video memory
- 14" SVGA LR Color Monitor
- MS-DOS 6.0, Windows 3.1, mouse

$ 1,539

Do-More Desktop

- 486 Blue Lightning, 66 MHz
- Upgradeable to Pentium technology
- 8MB RAM max: 64MB
- 256KB processor cache
- 3.5" 1.44MB diskette drive
- 240MB (15ms) hard disk
- Onboard SCSI
- 5 16-bit ISA slots (2 VESA on local bus)
- Windows accelerator with 1MB video memory
- ★ 15" Flat Square LR color monitor, NI
- Network-ready (Ethernet 10BaseT)
- Desktop casing (5 x 5)
- MS-DOS 6.0, Windows 3.1, mouse

$ 1,979

(For 8 x 6 minitower, add $50)

Multimedia Minitower

- 486 Blue Lightning, 66 MHz
- Upgradeable to Pentium technology
- 8MB RAM max: 64MB
- 256KB processor cache
- 3.5" 1.44MB diskette drive
- 440MB (12ms) hard disk
- Onboard SCSI
- 8 16-bit ISA slots (2 VESA on local bus)
- Windows accelerator with 1MB video memory
- CD-ROM drive
- Media Vision 16-bit sound card
- Stereo speakers
- ★ 15" Flat Square LR color monitor, NI
- Network-ready (Ethernet 10BaseT)
- Minitower casing (8 x 6)
- MS-DOS 6.0, Windows 3.1, mouse

$ 2,549

Pentium Processing Powerhouse

- Intel Pentium processor, 60 MHz
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- 8MB RAM max: 64MB
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- Onboard dual-channel fast SCSI
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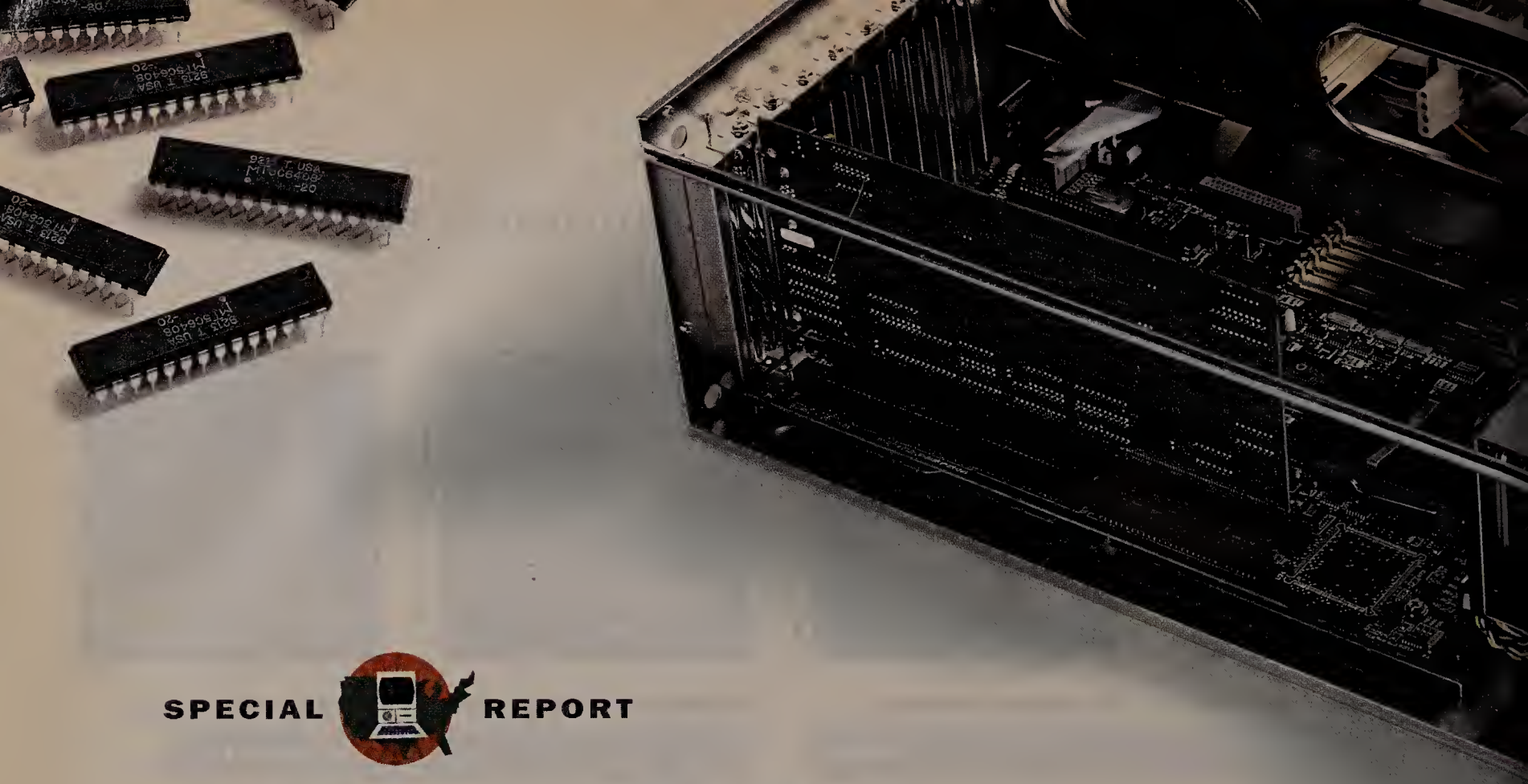
Circle 127 on reader service card



SPECIAL REPORT

Brand Name vs.

How do the best 486 PCs built in local stores stack up against major national brands? To find out, we dispatched shoppers nationwide to round up 5 local heroes to battle 19 national contenders. We collected streetwise tips for shopping locally and picking the right components. The result? This indispensable guide to buying your next PC.

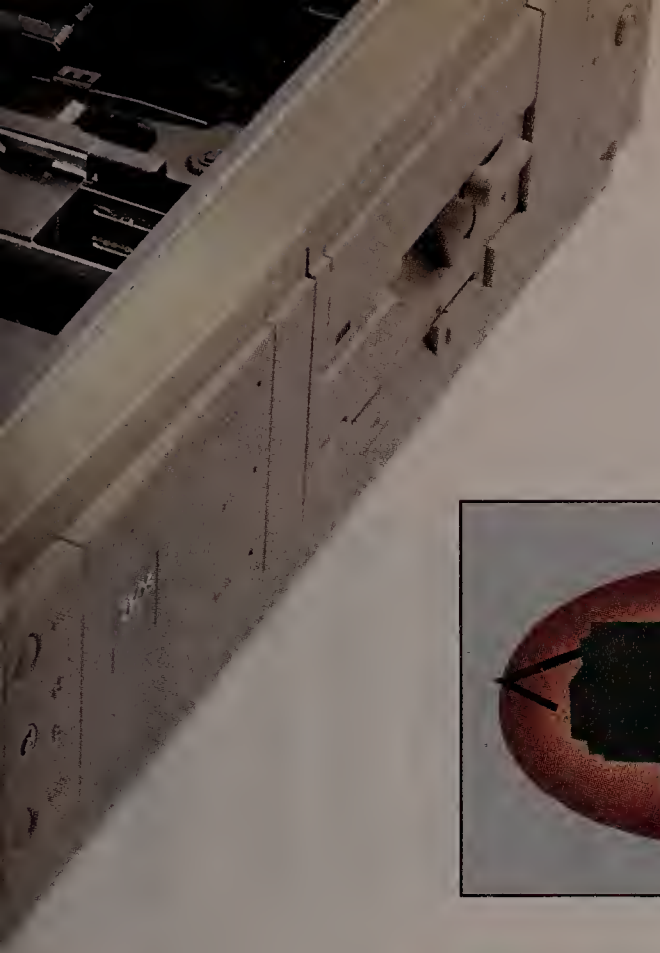
Looking for a great deal on a PC? If you live in a metropolitan area, there's probably a store nearby that assembles computers in the back room. And that store can construct a PC to meet your exact specifications and sell it to you for a reasonable price.

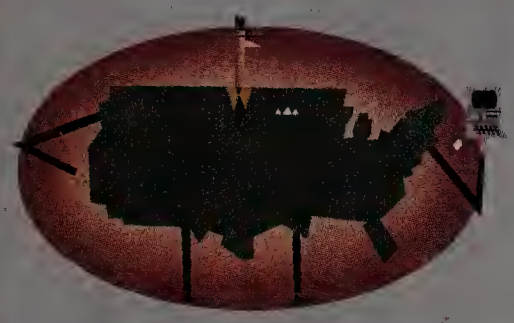
The reason is simple: Assembling a desktop PC is relatively easy. Any computer store with enough expertise to sell name-brand computers can easily put someone in the back room with a screwdriver to assemble computers on demand. And many local stores have done just that, offering house brands that compete in price and performance with the best national brands.

In this special section, we'll look at locally built clone PCs and help you decide if your next computer should be a store-assembled model. We'll also give you guidelines for shopping wisely, no matter where you buy.

When your computer is assembled at the store, you can have it configured your way. If you want this motherboard in that case with the other kind of hard disk, a good store can put it together for you. True, most stores don't have the BBS's, 24-hour hot lines, and on-site service that the big vendors offer, but they allow you to build a relationship with your dealer, and that's the kind of support that can't be measured.

How do store-built computers stand up to the national brands? Rex Farrance, Anita Hamilton, and Dan Miller find out in "486 Face-Off: Local Heroes or Little-Town Blues?" In this full-scale system roundup, we pit 5 store-brand computers from different cities against 19 national brands. None of our local contestants won a Best Buy, but 3 of the 5 came extremely close. One, built by Computer Square in Chicago, was the fastest machine in the roundup.





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Buying Locally pg 191

Picking the Right Pieces pg 206

No Name

If you're considering buying locally, nothing is more important than choosing the right store. Look for one that has a wide selection of products, knowledgeable and honest employees, low prices, and a good chance of still being in business five years down the line. In "The Pleasures and Perils of Buying Locally," Roberta Furger describes how undercover *PC World* investigators shopped for PCs at 25 computer dealers around the country. Their goal: to see if these stores could deliver the goods. Be sure to check out "Tips for Smart Shopping" for a guide to evaluating the stores in your area.

No matter where you buy your computer, making informed choices at the component level will result in a better machine. In "Picking the Right Pieces," TJ Byers and Lincoln Spector discuss the parts that make up a computer—from the motherboard to the hard disk to the case you put them into—and tell you how to recognize quality in all of them.

There are many important questions to ask when purchasing a computer; in fact, you should probably take a checklist with you. We provide one: a special Instant Reference Card. Take a copy of this card with you when you visit a computer store or call a mail-order company, and you'll have the right questions and a place to write the answers. The completed card will give you a clear picture of the quality of the system you're considering.

Basically, it comes down to three issues: quality components, complete service and support, and low price. If you can find them in your own neighborhood, why bother going elsewhere?

486 Face-Off

Local Heroes or Little-Town Blues?

Local 486DX2-66s from Boston, Miami, Chicago, San Francisco, and Los Angeles challenge national brand names for the PC World Best Buy. If they can make it here, they'll make it anywhere. But can they?

So much has changed in the way you buy computers, it's increasingly unlikely a single source will be able to lock up all your business. In fact, price wars and the trend toward marketing PCs as commodities have stood conventional where-to-buy notions on their head. Competitive prices are now available from national chain stores, computer superstores, and local assemblers; through the mail; and by direct sale to government and big business.

In addition, there's the question of buyer security. This last year has sent some computer heavyweights into Chapter 11 and seen other respected members of the establishment take a pummeling on the bottom line. So savvy buyers are looking long and hard before committing to a purchase, carefully weighing vendor reputation and ferreting out the best price, performance, and service and support. In this atmosphere, buyers often find that bigger doesn't necessarily mean better, and many local shops assembling store-name clones show remarkable staying power.

Sure, big-name manufacturers still hold an edge with most business buyers, but many businesses now also use smaller sources, both direct mail and local. It's not unusual to find large companies spot-sourcing and even making larger purchases through local assemblers. The combination of on-the-spot purchasing, attractive pricing, and local service is bringing big business to clone shops.

One problem with buying locally assembled PCs is the lack of reviews and evaluations. Friends or associates may be able to tell you about local merchants, but they can't tell you how these local clones stack up against national competition. *PC World* decided to

By Rex Farrance, Anita Hamilton, and Dan Miller

Testing by Ulrike Diehlmann and Susan Silvius; research and support by Dawn Furseth and John Goddard

Patriot

GATEWAY 2000

ACER

tackle this issue head-on and compare a sampling of locally assembled PCs with systems from market leaders and from vendors of recent Best Buy systems. (It's worth noting that although we polled all the market leaders and recent Best Buy winners, for a variety of reasons some prominent players don't have PCs in this review. For example, Dell was bringing out new products whose release didn't coincide with our publication date.) Of course, we couldn't review PCs from every locality, but to give you an idea of what you can find, we hunted up products in U.S. metropolitan areas holding the largest concentrations of our readers.

We asked local user groups and consultants in those areas to recommend stores, ruling out national advertisers. We then confined our search to local sources recommended by this group of advisers. Not every assembler we contacted was responsive, but we ultimately found stores in the Boston, Chicago, Los Angeles, Miami, and San Francisco areas that welcomed our challenge. While the specific local systems reviewed may not be a likely choice for buyers beyond the assemblers' immediate area, they do give a good indication of how a careful shopper can fare buying a hometown PC. The results of our investigation may surprise you.

Up Close and Local

Finding sources in your locale can be as easy as picking up your area's computer newsletter or magazine and checking the ads for attractive deals. But how can you see beyond the profusion of tantalizing advertising to ensure the outlet you're dealing with is not only inexpensive but safe?

Maybe you're lucky enough to have a recommendation from a friend who has a lasting relationship with a store in your area. Even so, you should read Senior Editor Roberta Furger's complete rundown, "The Pleasures and Perils of Buying Locally," in this issue. And while you're at it, peruse TJ Byers and Lincoln Spector's "Picking the Right Pieces" to learn which PC components to ask for in your dream system. To make your job even easier, Assistant Technical Editor Shane Rau prepared an Instant Reference Card checklist of everything you should consider in selecting *any* PC.

Why Take the Local Bus?

The testing for our review of video boards last month indicates that the local bus is the quickest mode of graphics transit—especially if you're using either 24-bit color at high resolution or full-motion video. On the other hand, users of typical business applications will see just a modest improvement in speed over ISA bus graphics adapters. So while video controllers that send their signals over the local bus are a must for graphics and multimedia heavyweights, they're not essential to the business user.

Fortunately, local bus slots add relatively little to a motherboard's cost, and even local bus graphics peripherals are priced in the same range as their ISA equivalents. Since you can't always predict your future applications, why not buy a system with local bus video? As an additional bonus, a local bus system virtually assures that you're getting in on the latest round of motherboard technology.

Is There Life After 486?

With a range of 486s as well as Pentium PCs on the market, what CPU should you invest in to keep up with the application demands of the next few years? You'd like technology with the long-range endurance of the 33-MHz 486DX, which has proved to be a real business workhorse while remaining nimble enough to handle evolving business applications. Chances are if you bought a 486DX-33 three years ago, it's still pulling its weight in the office today.

Currently, systems built around the 66-MHz 486DX2 enjoy the same status as the 33-MHz 486DX did in the past—they're the most powerful, practical business PCs of their time. Unless you run the kind of high-end application that demands the moxie of a full-bore Pentium box, you should be able to buy an affordable 486DX2-66 local bus PC right now and have a machine that will handle your application needs efficiently for the next few years.

But what about upgradability? Despite optimistic predictions and "Pentium-ready" claims from system vendors that have been featuring 238-pin CPU sockets in their PCs this year, the next-level upgrade for top-speed 486 systems remains shrouded in mystery. While Intel is promising some kind of Pentium OverDrive upgrade

Best Buys

Whether it comes from a national mail-order giant or the PC shop down the street, today's average DX2-66 is faster, cheaper, and better. So while we chose five Best Buys, the next five PCs are great values too. Our top picks combine great performance on a wide variety of business applications, super support, and enough expandability to keep you up-to-date for years to come—all at below-average prices.

1. **Netis N4D266** *pg. 166*
2. **Gateway 4DX2-66V** *pg. 160*
3. **AcerPower 486v** *pg. 148*
4. **Blackship BLK 486DX2/66 LB** *pg. 154*
5. **Diamond DT 486DX2-66** *pg. 158*

CLOCKWISE FROM TOP LEFT: AcerPower 486v, Blackship BLK, Diamond DT, Netis N4D266, and Gateway 4DX2-66V.

for 486DX2 computers, some system vendors and motherboard manufacturers are skeptical that every 238-pin system will be able to accept and run it. Heat and power-consumption problems, they suggest, may prevent the rosy dream of universal upgradability from materializing. However, Intel may have other solutions for this socket that are not based on Pentium. Whatever the upgrade future holds, you have your bets covered with a powerful 66-MHz 486DX2 processor.

486DX2-66s are also a comparative bargain. You can get one for a third of what a 486DX-33 cost three years ago. Prices in this review range from Blackship's low of $1995 to NCR's high of $4785, with the average price just over $2800. That's not bad, considering that each machine held at least 8MB of RAM and a 200MB or larger hard disk. Machines from Computer Square, Gateway, Magic Box, and NCR provided an impressive 16MB of RAM. Furthermore, ten companies provided hard disks larger than 300MB, and the NCR, Unisys, and Zeos hard disks topped 500MB. The attractive prices and generous configurations make this kind of buying opportunity hard to pass up.

A note about memory: While 8MB of RAM is adequate for typical business Windows applications, you'll want 16MB if you plan to run OS/2 2.1 or Windows NT. Power users of these RAM-hungry operating systems may want even more, which brings up an important point: Many of the vendors in this review filled all their memory sockets with 1MB SIMMs to reach 8MB. *PC World* does not recommend this memory configuration because you have to remove memory to add more, which increases your expense. So ask your vendor to install the highest-capacity SIMMs that are practical. It's worth paying a premium now for 4MB or 8MB SIMMs if you plan to upgrade in the future; you'll save dollars in the long run.

Protecting Your Investment

No matter whom you buy from, there's no guarantee the vendor who sold it to you will remain in business. Clearly, top-tier vendors have more resources and appear more likely to traverse a rocky road without vanishing into a pothole. But recent experience indicates that even the biggest wagon can suffer a broken axle. So if you buy through the mail, always use a credit card. If the company fails to deliver, you'll have recourse and may be able to recover your funds.

But what happens if your vendor disappears and, say, your motherboard dies? If you have purchased a system in a standard-size case, you should be able find a new third-party motherboard that will work in it. Your best bet is to stick with PCs whose local bus peripherals use a common standard, and the VESA and PCI specs seem destined for the greatest longevity. With VESA and PCI, you should be able to find a new motherboard that accepts your existing local bus peripherals.

66-MHz 486DX2 + Local Bus = Top Performance

Ultimately, 24 contenders completed the PC World Test Center's applications test suite. Five systems—the ALS 486DX2-66 LB (Boston), Computer Square Patriot PCN1 486DX2/66 (Chicago), Jet Research Jet Algo 486DX2/66 Local Bus System (Los Angeles), Magic Box Power VESA 486DX2-66 (Miami), and Toptek Top486DX2/66 (San Francisco)—were assembled locally and are marketed directly, primarily to local customers. Their performance was more than respectable. Only the Magic Box system dipped

Best Performance

Most of today's fastest systems, whether from local assemblers or national vendors, use DX2-66 CPUs and the local bus to speed up graphics-intensive apps. That may be why the 15 top performers varied by only 15 percent or less—remarkably consistent high performance for such a wide variety of systems.

1. **Computer Square Patriot PCN1 486DX2/66** *pg. 158*
2. **Netis N4D266** *pg. 166*
3. **Diamond DT 486DX2-66** *pg. 158*
4. **Axik Ace Cache 486DX2-66V** *pg. 154*
5. **AcerPower 486v** *pg. 148*

Best Price

Do systems from local stores cost less than those from the big national firms? Sometimes yes, sometimes no. Three of our top five price leaders come from local assemblers. The other two, however, are from well-established vendors that sell through nationwide mail order.

1. **Blackship BLK 486DX2/66 LB** *pg. 154*
2. **Netis N4D266** *pg. 166*
3. **Toptek Top486DX2/66** *pg. 168*
4. **ALS 486DX2-66 LB** *pg. 152*
5. **Jet Research Jet Algo 486DX2-66 Local Bus** *pg. 160*

Best Service and Support

High speed and low price are nice, but what if your system breaks down and you can't get anybody to fix it? If you're buying locally, your prime concern should be the warranty. If you're buying from a national vendor, check the warranty, on-site service, and tech support policies. Some nationals now offer two- and three-year warranties, and most offer free on-site service.

1. **NCR System 3000 Model 3333** *pg. 165*
2. **Compaq ProLinea 4/66 240/480/w** *pg. 156*
3. **NEC Image 466** *pg. 165*
4. **Unisys PW2 Advantage 4666** *pg. 178*
4. **ZDS Z-466X+ Model 340** *pg. 178*

noticeably below our overall historical average for 486DX2-66s. Even then it fell short by less than 20 percent. The Computer Square Patriot, on the other hand, recorded the top overall benchmark scores here and virtually equaled the best overall results we've ever measured on a 486DX2-66.

The other 19 systems came from market leaders and winners of recent Best Buys. These PCs are sold by direct and mail-order vendors and by dealers. Performance benchmarks were remarkably even in this review, with PCs from Netis, Diamond, Axik, and Acer filling out the top five overall after Computer Square. The next four positions were clumped so close to the fifth-place AcerPower 486v that the differences are essentially meaningless. So the Polywell Poly 486-66EV, ALS 486DX2-66 LB, Gateway 4DX2-66V, and NEC Image 466 all deserve special mention. And that's not all: The 15 best-performing PCs varied by 15 percent or less overall. That's a remarkably consistent level of high performance.

Don't Forget About Service

When you're buying any PC, don't disregard essential service and support issues (or let your vendor neglect them). If you're buying locally and it's convenient to take your PC to the shop for repairs, your prime concern will be the warranty. All the locally assembled machines reviewed here come with 12-month warranties. ALS, however, sweetens its coverage with free labor for the life of its PCs. The most outstanding warranties come from the biggest vendors: Compaq, NEC, and NCR all cover repairs for a fantastic 36 months. Of course, Micro Express's and Polywell's 24-month warranties are nothing to sneeze at. And Polywell augments its coverage with an additional 36 months of free labor.

Fourteen systems come with a year or more of free on-site service. Toptek, however, provides this benefit only within San Francisco city limits. (Ask about similar policies from companies in your area.) Otherwise you must bring the system in for repairs or pay $75 per hour for an on-site visit—a pricey alternative at best. In addition to the companies with free on-site service, another four charge less than $100 for the first year, and only CAF lacks an on-site service option. The best deals come from Compaq, NCR, and NEC, which provide free on-site service for an unbeatable 36 months.

When it comes to support, advice is likely to be your most frequent need. You should be able to get accurate answers fast—without having to pay a toll on your call. Among the national vendors, only CAF lacked a toll-free line, although the company promises to have one in place by the time you read this. You won't usually require an 800 number if you're buying locally, as any toll charges will be minimal.

As always, we base our service and support evaluations on vendor policies and the calls we make simulating real-world problems. Technicians are human, so responsiveness and accuracy vary from review to review. But here the results were good overall. On a scale where 10 is best, only Jet Research's score fell slightly below 8, while a third of the systems rated 9 or above. NCR's, Compaq's, and NEC's great policies propelled these companies to the top of our ratings. Unisys and ZDS wound up in a tie, filling out the top five, and Tangent, Axik, and Compudyne deserve an honorable mention. An additional note: In September we began including a fax-back evaluation for service and support in every issue. Starting early in the new year, we'll be supplementing our research with information from these surveys to give you an even better idea of what kind of support you can expect.

Buying the Best

The systems in this review ran one of the tightest races in recent experience. We were very pleased to see that well over half of them represent a very good value for a wide range of buyers. And three of

AcerPower 486v

VITAL STATISTICS

Street price: $2449
PROS: Third fastest Windows system, excellent expandability
CONS: SIMMs partially obstruct two slots
Contact: Acer America, 800/733-2237, 408/432-6200
Reader service no. 608

Acer has two lines of desktop PCs: the Acros series (also in this review), aimed at the home and small-office markets; and the AcerPower brand, for buyers who need more brawn. The AcerPower 486v is our choice as the best Acer for serious business computing and as one of the best systems here, period.

Performance is the main reason the AcerPower earned a Best Buy. Its times in our BAPCo tests were good, and in our Windows suite they were great. This is the third fastest Windows machine in the review, imperceptibly slower than the fastest Windows system we've ever tested and 16 percent ahead of the all-time average for similarly configured DX2-66s. More significantly, it's the fastest PC here not using a caching hard drive controller; its worst scores came in the most disk-intensive segments of the BAPCo suite. Most users will employ a software cache, which will yield performance comparable to that of a caching controller.

In addition to offering top-notch performance, Acer left plenty of room for upgrades. Its motherboard has a 238-pin socket, so you'll be able to install some kind of OverDrive when one is available. One VLB slot and six ISA slots are free. The system's 8MB of RAM is upgradable to 64MB. One of two internal drive bays is occupied by a generous 340MB Western Digital hard drive, and you get two free externally accessible bays. Acer has thoughtfully pulled all the power and drive cables to one side, so the three free SIMM sockets and the expansion slots are easily accessible.

We have only one minor complaint about the system's design: SIMMs could obstruct full-length cards in two of the ISA slots. But we were a bit more concerned about Acer's customer service. While Acer gives you a year of free on-site service, a 30-day money-back guarantee, and 14 hours of toll-free tech support on weekdays plus 9 on Saturdays, the tech support staff missed our most difficult question and kept us on hold for up to 16 minutes.

the five locally assembled systems finished quite high in the ratings: The Computer Square, ALS, and Toptek PCs missed a Best Buy rating by just a whisker, and we can give a hearty recommendation to all three for readers in the Chicago, Boston, and San Francisco areas, respectively. If we graded systems as if they were term papers, with the top machine getting a perfect 100, we'd give the lowest-rated locally made box a very respectable 85. However, the real lesson lies beyond the specific tale of these five machines: Our experience indicates that products put together in a local shop can be an excellent choice, even compared head-to-head with national brands—as long as you choose carefully, with a close eye on service and support.

If you want to have a personal conversation with the person who puts your system together, the local option may be your best choice.

The local advantage is not based entirely on price, although our local systems averaged about $350 less than the nationals. If you want to be able to have a personal conversation with the person who puts your system together or to specify all your components, the local option may be your best choice. Compared with mail-order vendors, a local company is likely to deliver your system much more quickly, even if you specify each component. Buying locally can allow you to build a solid working relationship. And local company longevity is often impressive, as San Francisco–based Toptek's nine years in business attest.

It's not often we get to pick Best Buys from this strong a field. Keeping in mind that at least four other systems came very, very close, you can see that the winners really had to shine. Mail-order seller Netis earned its first *PC World* Best Buy with its N4D266. Priced at a mere $2150, this model is so easy on the wallet, only the Blackship costs less. And the fine price didn't come at the cost of performance: This PC's overall benchmarks were second only to the Computer Square Patriot's. We were pleased that Gateway returned to our Best Buy ranks with its 4DX2-66V. This fast desktop favorite was among the most expandable PCs here, and we were heartened to see Gateway's support response return to the comfort level; it had suffered in recent months while the company expanded its staff to meet increased demand.

Acer put together an attractive $2449 street price and excellent performance to earn a Best Buy for its AcerPower 486v system, while Blackship appeared yet again in the winner's circle with a combination of a tempting $1995 price, generous expandability, and solid service and support. And finally, Diamond's excellent performance combined with a reasonable $2489 direct price enabled it to lock up the last of our Best Buys.

It would be unfair not to mention Micro Express, Computer Square, ALS, and Toptek, all of which provided systems that were so close to earning Best Buys that they're a cinch to top many buyers' lists. Three of these four systems are assembled locally. Which goes to show, you may be able to find a super deal right in your own backyard.

Rex Farrance is an associate editor and Dan Miller and Anita Hamilton are assistant editors for PC World. *They can be reached on PC World Online (see page 10 for contact information).*

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Still, the AcerPower 486v is really a lot of machine for the money. For less than $2500, you get a system that's fast today and promises to stay fast well into the future. It's that kind of reliable power, combined with the clean, well laid out design, that distinguishes the AcerPower and earns it our Best Buy recommendation.

Acer Acros 486DX2/66

VITAL STATISTICS

Street price: $2349
PROS: Good software bundle
CONS: Limited expandability, relatively slow
Contact: Acer America, 800/733-2237, 408/432-6200
Reader service no. 609

While Acer's AcerPower systems are intended for power users, the same company's Acros line is aimed at the home and small-office markets. Priced just $100 less than the AcerPower 486v, the Acer Acros offers surprisingly less computer for the money—so much less that we'd buy the AcerPower instead for our home office.

The biggest difference lies in performance. While the AcerPower was one of the fastest systems in this group, the Acros posted far slower benchmarks. It finished last and next-to-last, respectively, in the Word for Windows and Excel tests. However, you should remember that these are all fast systems; the Acros's overall performance is substantially equivalent to our historical average for similarly configured DX2-66 systems.

Speed isn't the only difference between the Acer PCs. While the AcerPower has seven free slots, the Acros has just three (two VLB, one ISA). And the Acros has one free 5¼-inch externally accessible bay versus the AcerPower's two, and just two memory sockets, one of which is filled with an 8MB SIMM. The Acros's 250MB Conner hard drive is nearly 100MB smaller than the AcerPower's drive. To its credit, the Acros does give you a 238-pin socket.

The Acros does one thing better than the AcerPower: It gives you copies of Microsoft Works for Windows, the Microsoft Productivity Pack, Intuit's Quicken for Windows, Phoenix Technologies' Eclipse Fax for Windows, starter kits for America Online and Prodigy, and a 9600/2400 fax-modem. Still, despite the Acros's software bundle and slightly lower price, we'd say the AcerPower is the better system for business use.

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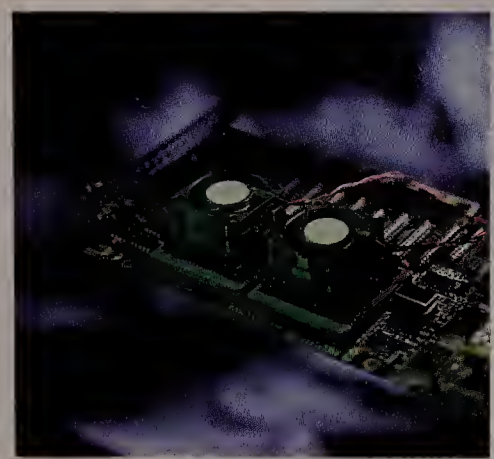

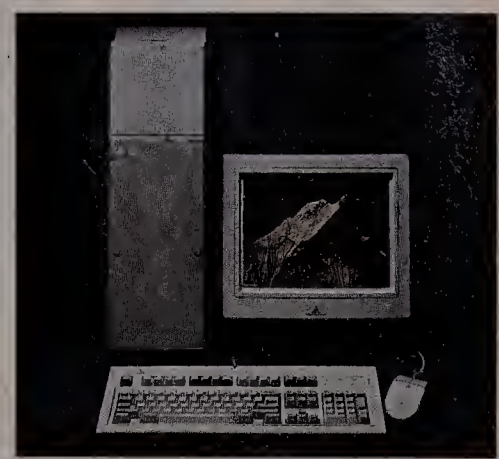

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Acma 486-66/DX2 VESA System

VITAL STATISTICS

Direct price: $2495
PROS: Great 15-inch Mag monitor, good price
CONS: Support could be more accurate
Contact: Acma Computers, 800/786-6888, 510/623-1212
Reader service no. 610

Acma's powerful, consistent showings in *PC World* reviews earned its 486-66/DX2 VESA System a spot in this review. The first thing we noticed about this tower unit was its tempting direct price: $2495 for a 66-MHz 486DX2 VESA local bus system with a 256K secondary cache, 8MB of RAM, and a 250MB Conner hard disk. Acma doesn't skimp on components either, filling both VESA slots with local bus peripherals—an Orchid Fahrenheit VLB card with 1MB of DRAM and a caching local bus IDE controller with 512K of cache. Unfortunately, Acma has filled all eight available RAM sockets with 1MB SIMMs.

The 486-66/DX2 VESA's overall performance fell into the middle of the pack, with marks in Windows applications lagging a bit behind the results on the DOS-heavy BAPCo SYSmark92 (where the caching controller provides significant help). Surprisingly, the system's worst showing came on the Paradox benchmark, where we'd expect the caching controller to help the most.

If a fine monitor is high on your priorities list, Acma includes a terrific 15-inch Mag MX15H display (identical to the MX15F model that won a Best Buy in our December 1992 monitor review). The extra inch of diagonal display will make a difference if you plan to run at resolutions higher than standard VGA. Like most towers, this roomy system gives you all the expandability you'll want, with five free full-length ISA slots and a half-dozen free drive bays, two of which are externally accessible.

Service and support are good, with a 12-month warranty backed by a year of free on-site service, a 30-day money-back guarantee, and a toll-free support line. The only major glitches: A technician couldn't answer our toughest question, and we waited 2 hours for a response on one call. Also, tech support is not available on weekends. Although the Acma 486-66/DX2 VESA System doesn't stand out in this crowd, it is a solid value, especially for buyers who demand low price and a super display.

Late List Prices

Only seven of this month's systems dropped in price between June and September, and even they fell by just $150 or less. This leveling of prices could be a sign of the shrunken profit margins caused by fierce competition in the PC marketplace. Compudyne and Polywell prices actually rose slightly because of higher memory cost. Don't be surprised to see other short-term hikes in system prices.

System Prices Remain Stable

	List price as of September 1993	Price drop from June 1993
Axik Ace Cache 486DX2-66V	$2598	$100
Compudyne SCI4DX2-66	$2699	+$88[1]
Diamond DT 486DX2-66	$2399	$90
Gateway 4DX2-66V	$2995	$45
Jet Algo 486DX2/66 Local Bus System	$2178	$151
Netis N4D266	$2050	$100
Polywell Poly 486-66EV	$3100	+$105[1]
Toptek Top486DX2/66	$2095	$90
Unisys PW2 Advantage 4666	$4200	$99

[1] Price increase due to higher cost of memory.

ALS 486DX2-66 LB

VITAL STATISTICS

Direct price: $2267
PROS: Low price, fine performance
CONS: Expensive on-site service, no 30-day money-back guarantee
Contact: ALS Computer Systems, 617/254-0003
Reader service no. 611

The ALS 486DX2-66 LB—the first locally assembled clone we looked at—impressed us with its combination of a low $2267 price and terrific performance. It's the fourth cheapest PC overall and the second cheapest supplied by a local assembler. But don't think ALS skimped on components. The Diamond Stealth 24 VLB video card and 2MB caching hard disk controller both send their signals via the local bus, and the 256K secondary cache further contributes to the unit's fine performance. The ALS 486DX2-66 LB's graphics and desktop publishing scores on the DOS-intensive BAPCo SYSmark92 test were the fastest in this review, helping it to a strong second-place showing on the complete BAPCo benchmark. In fact, this system was so quick, it barely missed our top five in overall performance.

Under the hood are five free 16-bit slots, and both free drive bays are externally accessible. Unfortunately, as with too many systems in this review, all eight RAM sockets are filled with 1MB SIMMs—meaning you'll have to replace at least some with higher-capacity SIMMs if you want to add more RAM.

ALS's service was for the most part good. While phone support isn't available on weekends and there's no money-back guarantee, tech support answered the phone immediately when we called during business hours. All the answers except one were right on the

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money. ALS offers a pricey on-site service option at 10 percent of the system price—in this case $227. But for that investment, Boston buyers get an outstanding 4-hour response, a time few national vendors can match. If you take the unit back to the store, ALS gives you lifetime free labor in addition to a one-year parts warranty.

Looking at the big picture, this system shows what an outstanding deal you can hunt up on a homegrown product. In fact, the 486DX2-66 LB's high overall value rating came remarkably close to earning it a Best Buy. With that in mind, we wouldn't hesitate to recommend this system to buyers in the Boston area.

Axik Ace Cache 486DX2-66V

VITAL STATISTICS

Direct price: $2698
PROS: Fast performance, very good service and support
CONS: Support accuracy could be better
Contact: Axik Computer, 800/234-2945, 408/735-1234
Reader service no. 612

The Ace Cache 486DX2-66V came through with the kind of hot performance that has boosted direct vendor Axik's reputation over the last year. This system, which is based on Axik's own VESA local bus motherboard, was fourth in overall performance—less than an eye blink behind the first three machines. Aided by its 1MB Promise DC-4030VL local bus caching hard disk controller, the Ace Cache aced the Paradox test, posting the best results we've ever seen. In addition, this PC virtually tied our best-ever Word for Windows results, and it posted almost as good a showing on Excel.

When you get down to it, this unit has just about everything we look for in a high-performance PC: a 238-pin CPU socket, 256K of secondary cache, a Diamond Viper local bus video card with 2MB of VRAM, and a 245MB Quantum hard drive, along with a tower case that leaves plenty of room for expansion. Three externally accessible and two internal drive bays are free, and you get four free expansion slots. Unfortunately, Axik filled all eight RAM sockets on our test PC with 1MB SIMMs, leaving no room for easy expansion. Any way you slice it, that adds up to more trouble and expense in upgrading your RAM. We suggest requesting a configuration that leaves you some sockets available for expansion without your having to discard installed RAM.

Service and support is very good, with a 12-month warranty backed by free on-site service, a 30-day money-back guarantee, and a 2-day turnaround policy. Calls to tech support were answered immediately, but one question went without a correct answer.

As always, we were impressed by Axik's design, fit, and finish. Everything is neat, accessible, and easy to work on. Considering the system's speed and impressive design, its below-average $2698 price is eminently reasonable. For the performance-conscious buyer, the Axik Ace Cache 486DX2-66V is one of the better values in a review that's chock-full of them.

Blackship BLK 486DX2/66 LB

VITAL STATISTICS

Direct price: $1995
PROS: Second lowest price plenty of room for expa lo
CONS: No weekend tech support
Contact: Blackship Comp e Systems, 800/531-7447, 408/432-7500
Reader service no. 613

Some Best Buy systems do everything well; others specialize. This Blackship is a textbook example of the specialist. The BLK 486DX2/66 LB earns top marks for low price and excellent expandability without sacrificing good application speed or fine service and support in the process. At a fantastic direct price of just $1995, this system breaks the magic $2000 barrier, something none of the rest of the DX2-66s in this review do. That means you don't have to have deep pockets to own one of the fastest CPUs on the desktop.

This machine also gives you almost every possible option for upgrading. Your expansion options start with a 238-pin ZIF CPU socket, and the 256K secondary cache is expandable to a whopping 1MB. You can increase memory from 8MB to 64MB, but—as with other similarly configured machines in this review—you'll have to discard at least some of the 1MB SIMMs that currently fill all the RAM sockets. You get two VLB, three 16-bit, and two 8-bit expansion slots; all the ISA slots are free, but both of the local bus slots are occupied (by the video board and an I/O controller). You also get two free externally accessible bays, with one in each size.

Blackship delivers low price and high expandability without sacrificing speed or service.

As always, Blackship's service and support policies are decent. The company gives you a year of free on-site service and a two-day turnaround guarantee on repairs thereafter. With just one exception, the tech support staff answered our anonymous calls promptly and correctly. Our only complaint is minor: Tech support is available just 9 hours a day during the week and not at all on weekends.

You do give up a few things for this system's low price. For one thing, performance is average; the Blackship's numbers in both our Windows and BAPCo suites were at or a little below historical averages for similar systems. Still, even an average 486DX2-66 is fast enough for everyday business use. You also sacrifice some video quality. Because the 14-inch KFC monitor has a maximum 48-kHz horizontal scan rate, you're limited to a 60-Hz refresh rate at 1024 by 768 resolution. But these are small complaints when you consider what you get for less than $2000. If you'd rather not spend a lot now, thinking you'll upgrade somewhere down the road, this Blackship is a value-packed Best Buy.

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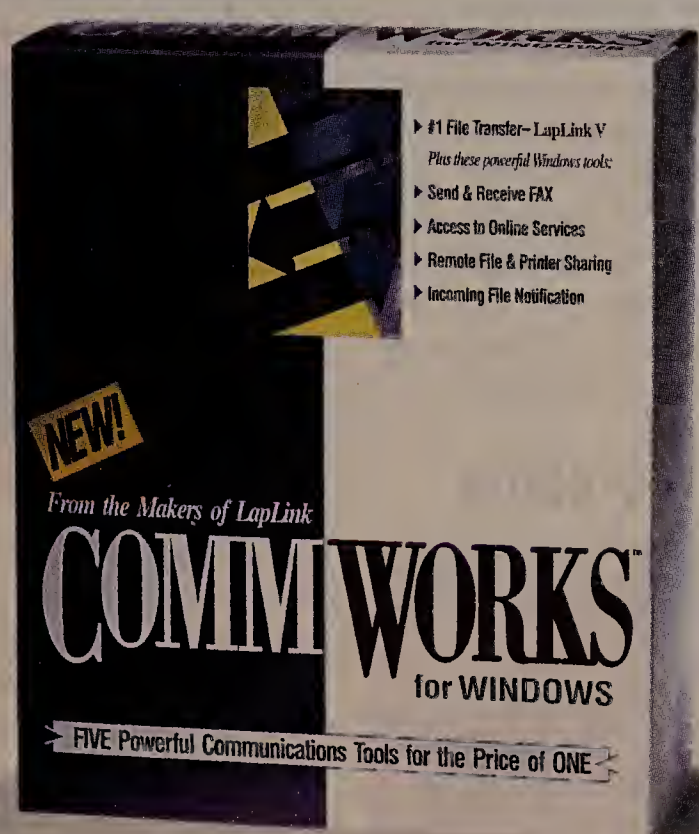

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CAF VL DX2-66

VITAL STATISTICS

Street price: $2762
PROS: 345MB hard disk, 4MB local bus caching hard disk controller
CONS: No on-site service option
Contact: CAF Technology, 818/369-3690
Reader service no. 614

Size up the CAF VL DX2-66, and you can't miss the impressive configuration, including a hefty 345MB Maxtor hard drive and a 4MB Promise DC-4030VL caching disk controller. That setup's bound to excite buyers with disk-intensive applications. And the $2762 street price—just below average for this review—is A-OK too.

Performance fell in the lower midrange, however, despite the 256K secondary cache. And results were uneven on the individual components of the BAPCo SYSmark92 test suite.

The video setup is more than adequate: The Paelit Cirrus AVGA card comes with 1MB of DRAM, and CAF throws in a 15-inch monitor. But the standard desktop case doesn't offer as much expandability as some: Two free externally accessible drive bays are respectable, but of the four free slots, only one accepts a full-length card. And all the RAM sockets are filled with 1MB SIMMs.

CAF's service and support is improving, but you'll still have to seek an on-site service option from your dealer. And you won't find weekend support. Fortunately, CAF's tech support lines should be toll-free by the time you read this, and we encountered quick responses and accurate answers. Other perks include a 2-day service turnaround and a new BBS. Unlike many companies that sell through dealers, CAF gives you a 30-day money-back guarantee. This PC is priced very competitively considering its storage setup, but you can find better performance and service elsewhere.

Compaq ProLinea 4/66 240/480/w

VITAL STATISTICS

Street price: $2769
PROS: Three-year warranty, exemplary tech support
CONS: Limited expandability
Contact: Compaq Computer, 800/345-1518, 713/378-8820
Reader service no. 615

If we had reviewed this Compaq ProLinea six months ago, its $2769 price would have been one of the lowest. But now the industry has responded to Compaq's deep price cuts, and today that same reasonable price is just slightly below the average for systems in this review.

One factor that has not changed is Compaq's exemplary service. The company's three-year warranty sets the standard other vendors try to match. Compaq also offers top-notch technical support, 24 hours a day, toll free. Our only complaint: We waited 38 minutesl to get through to tech support on one call.

Compaq's top-notch 24-hour tech support and amazing three-year warranty set a lofty standard.

The ProLinea design is extremely clean, from the sturdy, low-profile case to the neat, spare motherboard. But we're afraid this ProLinea isn't designed for expandability. You get three ISA slots on a riser card—all free—but there are no free drive bays, nor will you find a 238-pin upgrade socket on the motherboard. As currently configured, the system is only an adequate performer.

Still, you may not want the fastest performance or need super expandability, and to judge by the ProLineas' popularity, you're not alone. If you want Compaq's super service and support and the security that comes with buying from a nationally known vendor, the ProLinea is a fine choice. If you want a system with a lower price or better speed and expandability, we'd suggest you look at one of our Best Buys instead.

Compudyne SCI4DX2-66

VITAL STATISTICS

Direct price: $2611
PROS: Fine expandability, solid service and support, Mag monitor
CONS: Lower-end performance, accessibility somewhat limited
Contact: CompUSA Direct, 800/862-3095, 214/702-0055
Reader service no. 616

CompUSA Direct's nationwide network of superstores gives it a strong presence in major metropolitan areas—over 50 stores at press time, with 30 more scheduled to open by June 1994. This prevalence is good news for consumers looking for a local connection to a national outlet. In fact, you can either walk into your local store or place your order over the phone. The $2611 SCI4DX2-66 comes with free on-site service and one-day turnaround on factory repairs. The company's telephone tech support earns a thumbs-up for impeccable accuracy and hold times consistently under 5 minutes. This responsiveness is a pleasant improvement from the lengthy hold times and frequent busy signals that we've encountered with CompUSA in the past.

The compact desktop case leaves plenty of room for expansion: You can insert five full-length cards and fill three drive bays, two of which are externally accessible. And Compudyne provides a 238-pin CPU socket. A 2MB Diamond Viper VESA local bus card occupies the unit's single local bus slot, and the 15-inch Mag MX15F

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monitor—a December 1992 Best Buy—is a treat for the eyes.

The system's design is uncluttered and neatly laid out, except for a couple of RAM and secondary-cache sockets that are difficult to access when upgrading. You would have to unscrew the drive cage to upgrade the 128K secondary cache to its 256K capacity.

The system's overall performance tended toward the bottom of the scale compared with other units reviewed here, except for its midrange Word for Windows and Excel scores. Nonetheless, the SCI4DX2-66 is a commendable system, and those seeking to buy locally from a large, one-stop source with plenty of apparent staying power should have few qualms about the CompUSA package.

Computer Square Patriot PCN1 486DX2/66

VITAL STATISTICS

Direct price: $2999
PROS: Fastest system in review, good expansion options
CONS: Expensive on-site service
Contact: Computer Square, 800/956-4100 (Chicago area only), 708/885-7600
Reader service no. 617

If this system from Chicago is any indication, local vendors are every bit as savvy as the nationals when it comes to putting together a performance PC. Simply put, the Computer Square Patriot is the fastest machine in the review. It's 12 percent faster than the average system here, just marginally faster in our BAPCo tests than in our Windows suite. That adds up to a balanced, high-performance showing.

The Patriot's superior performance in graphics apps starts with a no-name VLB graphics accelerator based on ATI's Mach 32 chip. For memory-intensive computing, the system has a 256K secondary cache and 16MB of RAM to work with out of a possible 32MB. Finally, when it comes to disk-intensive tasks, the Patriot takes advantage of a local bus IDE caching controller equipped with a 1MB cache, which speeds throughput between the 345MB Maxtor hard drive and the rest of the system.

If the Patriot's current configuration isn't enough for you, the system has plenty of room to grow. It has a 238-pin ZIF socket for the CPU, promising future upgradability. The system starts with two VLB and five ISA slots; none of the VLB slots are free, but four of the ISAs are. For additional storage, one of two 5¼-inch externally accessible drive bays is free.

This system has trouble competing with the nationals in service and support as well as in pricing. While Computer Square guarantees to turn repairs around in two days and offers toll-free tech support, the company's contract for on-site service costs 7.5 percent of the system purchase price—in this case a stiff $225. The technical support office is open just 8 hours a day; when we called during those hours, the staff answered our calls speedily and fielded our questions well. Also, this system costs nearly $3000, more than the $2800 average for this review but still pretty good compared with prices for DX2-66s just a few months ago.

While the Patriot is too expensive to qualify as a Best Buy, it could be very tempting if you live in the Chicago area, where you could forgo on-site service and just take the system to the shop. As it is, the Patriot is proof that a thoughtfully assembled local system can be every bit as fast as one from a national vendor.

Diamond DT 486DX2-66

VITAL STATISTICS

Direct price: $2489
PROS: Excellent performance, attractive price
CONS: Only one of five free slots accepts full-length card
Contact: Diamond Technologies, 800/989-7253, 714/533-9910
Reader service no. 618

Want to know which one of the Best Buy PCs gives you the fastest overall performance? Look no further. The Diamond DT 486DX2-66 is the speediest of the five Best Buys, and it has the third fastest benchmarks here overall, rating very close to the fastest two machines. It sped to the head of the class on both the Excel and Word for Windows tests. Furthermore, this PC offers everything you expect to find in a high-performance 486DX2-66: You get a 256K secondary cache (expandable to 1024K), a 2MB DC-680 VL Bus IDE caching hard disk controller, and a 245MB Quantum hard drive. The Diamond Viper local bus video card comes with 2MB of VRAM, and Diamond even supplies a 15-inch CTX-CPS 1560 ProScan monitor, a perk whose benefits will become crystal clear if you need to run an application at 800 by 600 or 1024 by 768 resolution. All that, plus a low $2489 direct price, adds up to a winning combination.

The compact case has room for a couple of externally accessible drives, and you get five free slots. Keep in mind, however, that the location of the heat sink and drive cage confine your expansion options to half cards in four of the five slots. Fortunately, most cards come in the shorter length these days. But as with so many other PCs in this review, you'll have to discard some RAM if you want to expand beyond 8MB, as all eight of the motherboard's memory sockets are filled.

This small mail-order vendor does a very nice job with service and support. Diamond gives you a 15-month warranty and charges a reasonable $75 for a year of on-site service. On top of the 30-day money-back guarantee, you get a 2-day turnaround policy and six-day toll-free support. There's a BBS, and Diamond can fax you support documentation. Diamond's only technical glitch this time was the same one we encountered with several companies: One technician could not answer our most difficult question. To the company's credit, responsiveness was outstanding, and we spent next to no time on hold. If you want a really fast Best Buy unit that doesn't demand much desktop real estate, *and* you don't want to pay a lot for the deed of trust, the DT 486DX2-66 will make a great fit.

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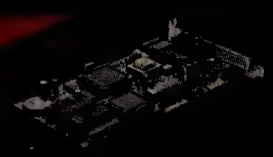

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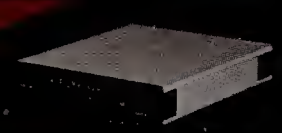

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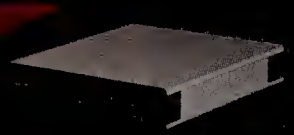

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Circle #5 on reader service card

Gateway 4DX2-66V

VITAL STATISTICS

Direct price: $3040
PROS: CD ROM drive, plenty of expandability, fast for Windows
CONS: Relatively high price
Contact: Gateway 2000, 800/846-2000, 605/232-2000
Reader service no. 619

This isn't the first time we've looked at this Gateway system, but in past reviews, we were looking for specific types of PCs. This time we're looking for overall quality, and Gateway's balance of price, performance, and design earns it a well-deserved Best Buy.

We've always admired Gateway's design smarts. Start with the outside of the box: This is one of just two systems here with a CD ROM drive. Inside you'll find a 238-pin ZIF socket for the CPU and a full 16MB of RAM, which you can expand to 64MB (to get to the higher capacity, however, you'll have to remove the 4MB SIMMs that already fill the four RAM sockets). You get an impressive 424MB Western Digital hard drive, which hooks up to the integrated local bus IDE adapter. One of the system's two VLB slots is occupied by an ATI video card, and one of the six 16-bit ISA slots contains a host adapter for the CD ROM drive; otherwise, all the slots are free. And check out *which* slots Gateway has chosen to fill: The two boards sit in the rightmost expansion slots, which means the other slots are clear of obtrusive cabling.

> *The real news this month is the strong revival in Gateway's service and support.*

The top-notch components aren't there just to look good, either. This is the eighth-fastest system here overall, noticeably faster than the average DX2-66. As we've seen in previous reviews, the 4DX2-66V is particularly speedy in Windows, 18 percent faster than the historical average for similar configurations; in the Freelance test, it's *26 percent* ahead of the historical average.

The real news this month is that Gateway's service and support has started to revive. In recent months, we regularly had trouble getting through to the company's swamped tech support lines during normal business hours. This month, the longest we spent on hold was 11 minutes—an immense and welcome improvement. Gateway still gives you a year of free on-site service and 18 hours a day, six days a week, of toll-free tech support.

Compared with other systems in this review, this Gateway's $3040 price is on the high side. However, it does include the capacious hard disk, your choice of a Microsoft application, and some DOS utilities. Given the improved service and support and the continuing excellence in design and performance, we're glad to award this system a hearty Best Buy recommendation.

Jet Research Jet Algo 486DX2/66 Local Bus System

VITAL STATISTICS

Direct price: $2329
PROS: Bargain price, spacious minitower case
CONS: On-site service costs $75 per hour, no 30-day money-back guarantee
Contact: Jet Research Laboratories, 818/578-0456
Reader service no. 620

Los Angeles readers will be pleased to know they can find a price this good in their backyard. The Jet Research Jet Algo 486DX2/66 Local Bus System is the fifth least expensive overall. The company put the system together with name-brand parts: For example, you'll find a Cirrus Logic local bus video controller and a 214MB Seagate hard drive—components often found in national brands. You get six free slots, and all three free drive bays are externally accessible. The minitower case is roomy, and the neat arrangement of cables contrasts with the cluttered look often seen in clones.

However, overall performance wasn't impressive, straying toward the bottom of the scale. And Jet Research support—which netted the lowest overall service score—leaves serious chinks in your armor. Technicians answered our calls quickly and courteously but could not answer two out of three test questions correctly. On the upside, the company promises to repair your unit in a single day if you bring it in. On-site service, on the other hand, costs a hefty $75 per hour, no matter how near you are.

If price is a prime consideration, the Jet Algo 486DX2/66 should prove to be very attractive to buyers in the Los Angeles area. But if comprehensive service and support is crucial, there are much better choices available. Our experience—with ALS and Computer Square in particular—shows that savvy buyers should expect to find more overall value in their local systems.

Magic Box Power VESA 486DX2-66

VITAL STATISTICS

Direct price: $2895
PROS: None
CONS: Slowest performance in review, expensive on-site service
Contact: Magic Box, 800/749-2638, 305/620-2770
Reader service no. 621

This local vendor took a unique approach to our request for its best DX2-66: It actually sent us a CompuTrend Premio with a Magic

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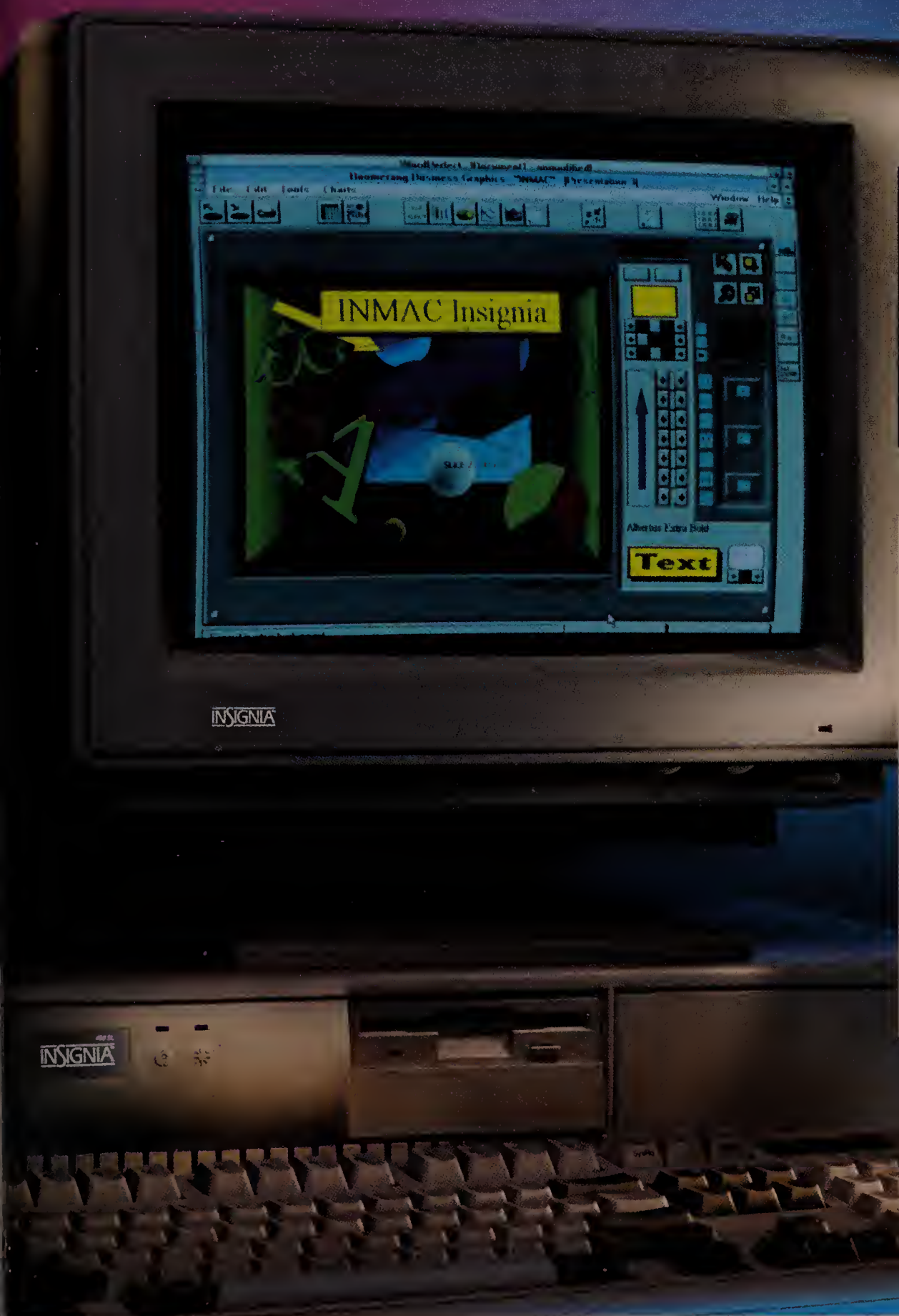

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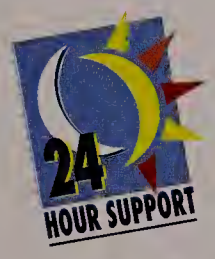

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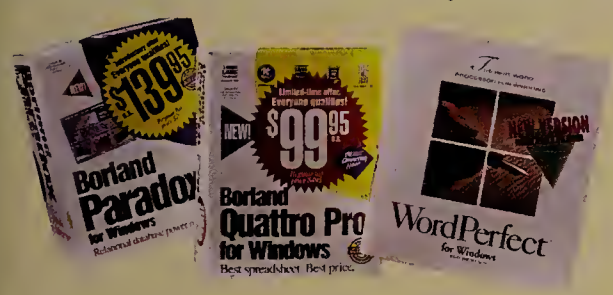

You save more than $1500 when you order your Inmac Insignia 450P computer Business Office Bundle. You get additional RAM plus a quartet of the latest releases of top brand software. You get everything you need to go to work the minute you plug in your system. We'll install and test it for you, FREE. But hurry. An offer this good won't last forever and this one expires on 11/30/93.

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- Paradox for Windows
- Central Point PC Tools for Windows

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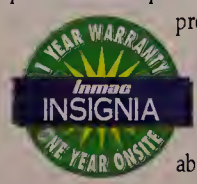

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SYSTEM

The systems below are preconfigured with four drive bays; five ISA expansion slots; two serial ports; one parallel port; keyboard; mouse; MS DOS; MS Windows; DiagSoft QAPlus; Lotus Organizer.

1 ☐ INMAC INSIGNIA 450SL IBM basic system with IBM 486SLC2 25/50 MHz CPU; 16 KB internal cache

2 ☐ INMAC INSIGNIA 433P basic system with Intel 486 DX/33 MHz CPU; 8 KB Write-thru cache

3 ☐ INMAC INSIGNIA 450P basic system with Intel 486 DX2/50 25/50 MHz CPU; 8 KB Write-thru cache

4 ☐ INMAC INSIGNIA 466P basic system with Intel 486 DX2/66 33/66 MHz CPU; 8 KB Write-thru cache

RAM

(Check one)

5 ☐ 4 MB

6 ☐ 8 MB

7 ☐ 16 MB

8 ☐ 32 MB

9 ☐ 64 MB (not available on 450SL)

MONITORS/VIDEO

10 ☐ SVGA Monitor 14", .28 1024 x 768 NI

11 ☐ SVGA Monitor 17", .28 1024 x 768 NI

12 ☐ ORCHID fahrenheit 128D+ SVGA Video Accelerator

DRIVES/SCSI ADAPTER

HARD DRIVE *(Check one)*

13 ☐ 120 MB

14 ☐ 170 MB

15 ☐ 255 MB

16 ☐ 340 MB

17 ☐ 540 MB*

FLOPPY DRIVE *(Must check dual or 3.5")*

18 ☐ DUAL FLOPPY DRIVE 3.5" & 5.25" (single drive bay)

19 ☐ 3.5" FLOPPY DRIVE

20 ☐ 5.25" FLOPPY DRIVE (as second drive)

21 ☐ SCSI ADAPTER

** Requires SCSI adapters.*

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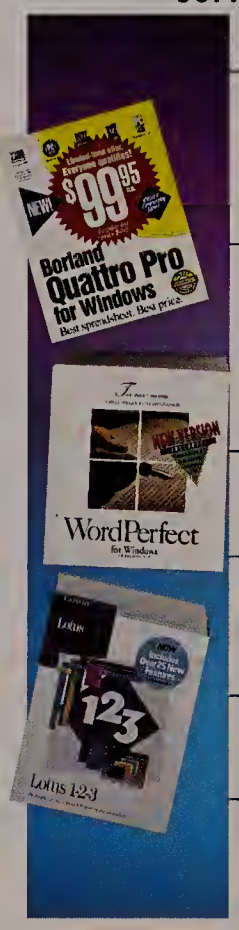

WORD PROCESSING

22 ☐ MICROSOFT WORD FOR WINDOWS

23 ☐ WORDPERFECT FOR WINDOWS

24 ☐ LOTUS AMI PRO FOR WINDOWS

SPREADSHEETS/FINANCE

25 ☐ MICROSOFT EXCEL FOR WINDOWS

26 ☐ LOTUS 1-2-3 FOR WINDOWS

27 ☐ BORLAND QUATTRO PRO FOR WINDOWS

28 ☐ MS MONEY

DATABASE MANAGEMENT

29 ☐ BORLAND PARADOX FOR WINDOWS

PRESENTATION GRAPHICS

30 ☐ MICROSOFT POWERPOINT FOR WINDOWS

31 ☐ LOTUS FREELANCE FOR WINDOWS

UTILITIES

32 ☐ CENTRAL POINT PC TOOLS FOR WINDOWS

INTEGRATED OFFICE APPLICATIONS

33 ☐ MICROSOFT OFFICE: Word, Excel, PowerPoint, Mail

34 ☐ LOTUS SMART SUITE: Ami Pro, 1-2-3, Freelance, cc:Mail

35 ☐ BORLAND OFFICE: WordPerfect, Quattro Pro, Paradox

NETWORKING

36 ☐ 3COM ETHERLINK III COMBO (AUI, TP, BNC)

37 ☐ IBM 4/16 ISA TOKEN RING ADAPTER

38 ☐ INTERNAL 9600/2400 FAX/MODEM

39 ☐ INTERNAL 14.4 K BAUD FAX/MODEM

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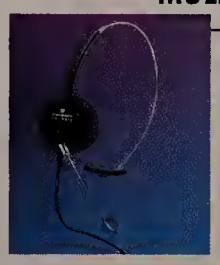

40 ☐ INTERNAL CD-ROM DRIVE

41 ☐ CREATIVE LABS SOUND BLASTER*

42 ☐ CREATIVE LABS VIDEO BLASTER*

43 ☐ MEDIA VISION PRO AUDIO SPECTRUM 16*

**Headsets included.*

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Box decal affixed to the case. Unfortunately, this system's mixed bag of design choices results in below-average performance at a slightly above average price of $2895.

On paper this system looks promising, with its 16MB of RAM (out of 32MB max), 256K secondary cache (expandable to 1024K), and local bus IDE connector for the 213MB Maxtor hard drive. But the Magic Box finished near the bottom on every test.

Like many local vendors, Magic Box can't beat the nationals when it comes to service and support. Though theoretically available 24 hours a day, the tech support staff is hard to reach, and like other local vendors, the company charges top dollar ($150 a year) for on-site service. The bottom line? If Magic Box upgraded its systems with better components and construction, we bet the company would be much more competitive.

Micro Express MicroFlex-VL/66

VITAL STATISTICS

Direct price: $2499
PROS: 4MB caching disk controller; good price, performance, service and support
CONS: Marginal monitor
Contact: Micro Express, 800/989-9900, 714/852-1400
Reader service no. 622

Micro Express has earned many Best Buys in recent reviews, and the 486DX2-66 MicroFlex barely missed the top five this time. While over a third of the contenders in this review match or surpass it in the close competition for the performance crown, the MicroFlex is still a very fast PC. Its benchmarks are just slightly behind those of the fastest PCs. At the same time, the MicroFlex beats the historical overall average of 66s by 10 percent.

The system is wrapped in a trim minitower package with three free externally accessible drive bays. You get four 16-bit slots and one 8-bit slot free, but only one (a 16) accepts a full-length card. The two local bus slots are loaded with a Diamond Viper VESA card with 2MB of VRAM and a 4MB Promise DC-4030VL caching controller. A generous 340MB Western Digital drive handles storage duties. Micro Express provides a 238-pin CPU socket to pave an easy upgrade path, but the eight RAM sockets are all filled with 1MB SIMMs. The low-cost 14-inch FM360 monitor contributes to the thrift-conscious $2499 price. But the display is just adequate for most business applications, and you might be happier if you shelled out the bucks for a better model.

From review to review, service and support is always a steady factor with Micro Express. The 24-month warranty is comforting, and the first year's on-site service costs a reasonable $50. You get a 30-day money-back guarantee, a 2-day turnaround policy, and toll-free support on weekdays. To deal with trouble at night or on weekends, you can call Micro Express's toll line, reach an automated beeper service, and expect a timely return call. All in all, the MicroFlex is a super value—almost a Best Buy—and a testimonial to Micro Express's consistency.

NCR System 3000 Model 3333

VITAL STATISTICS

Direct price: $4785
PROS: Top-notch service and support, 540MB hard drive, CD ROM drive
CONS: Second most expensive system in review
Contact: NCR, 800/637-2600, 513/445-5000
Reader service no. 623

Buying from a vendor such as NCR or Unisys that specializes in selling direct to corporations apparently guarantees two things: high price and good service. But it takes *low* prices and good service to win our hearts.

NCR gives you everything you can reasonably expect in the way of support policies—a three-year warranty, a year of free on-site service, and toll-free tech support 24 hours a day, seven days a week. Surprisingly, however, NCR's tech support staff slipped up on one of our more basic questions.

The system itself is beautifully designed. It's one of two machines in this review that include a CD ROM drive. The system also ships with a muscular SCSI 540MB Conner hard drive, connected to an Adaptec adapter. Unfortunately, all four SIMM slots are filled with the 8MB of RAM, so you'll have to dump the current 2MB SIMMs if you ever want to upgrade .

Performance was good in Windows but average overall. The Diamond Viper video card, which won the speed trophy in our October review of graphics accelerators, no doubt had something to do with the excellent Windows speed. Unfortunately, the NCR was consistently below average in the BAPCo suite.

At $4785, this is by far the most expensive system in the review. Unless you're willing to pay that kind of premium to own an NCR product, we'd advise you to look at one of our Best Buys instead.

NEC Image 466

VITAL STATISTICS

Direct price: $3628
PROS: Great service, fine fit and finish, good performance
CONS: High price, limited internal drive expandability
Contact: NEC Technologies, 800/632-4636, 508/264-8000
Reader service no. 624

Let's face it. Many people insist on buying from a top-tier vendor because they feel assured the company will be around for the long haul to provide the service and support they need. Considering the stiff competition, NEC really had to shine to place among the close-packed service winners; the top

three, like NEC, all provide a 36-month warranty and free on-site service. NEC's toll-free support line connects to responsive, helpful technicians who handled all our questions with ease. Considering that response time and accuracy are near the top of the list of service musts, that speaks well for NEC. The only service blemish is the lack of weekend support.

Design is a traditional NEC strong point, and the fit and finish of the compact box is terrific. NEC even has a front-case connection for your keyboard and mouse. You can easily remove the case without tools, and you have clear access to everything inside. Although one drive bay is free, it's not accessible externally. Fortunately, all four 16-bit expansion slots can take a full-length card. NEC even includes a ZIF socket. Of course, you're unlikely ever to have to lift its lever, as the 486DX2 socket already holds the most potent 486 CPU available. The system performed very well both on the Windows applications and on the more DOS-laden BAPCo SYSmark92 test. You get a generous 340MB Western Digital hard drive along with an integrated proprietary local bus video controller using 1MB of DRAM. In addition, NEC provided the excellent 15-inch NEC MultiSync 4FG monitor.

The fine design and super warranty don't come cheap, however. The $3628 price is third highest in this review. That—and the limited internal drive expandability—will give many buyers pause. But if you prefer to do business with one of the largest PC manufacturers in the world, and you demand a warranty that backs your PC to the hilt—you may feel it's worth spending the extra dollars.

Netis N4D266

VITAL STATISTICS

Direct price: $2150
PROS: Low price, fastest in BAPCo suite
CONS: Short tech-support hours
Contact: Netis Technology, 800/577-7526, 408/263-0368
Reader service no. 625

This Best Buy system from Netis Technology represents a remarkable combination of low price and high performance. It's not only one of the least expensive systems in this review but also one of the fastest. In fact, it is *the* fastest system here in the BAPCo suite, an impressive 20 to 40 percent faster than the average 486DX2-66. It's no slouch in our Windows tests, either; it scored above average in all four segments of our Windows suite, with its best time in the Paradox test, where it was almost 20 percent faster than the historical average.

It's not hard to figure out where the system gets its speed. It uses a Promise caching controller, loaded with 2MB of cache, to speed throughput to and from the 213MB Maxtor hard drive. That gives it a big performance advantage.in the BAPCo suite, where software disk caches are disabled under BAPCo rules. A software cache can bridge this gap in most business applications. The system speeds up Windows graphics with a Genoa accelerator card (rated among the top values in our October video board review). If the current performance is not enough for you, the system comes with a 238-pin socket, so you will be able to upgrade to an OverDrive chip. Upgrading RAM will require tossing some SIMMs out, however, as all eight sockets are full. With two free 5¼-inch drive bays and the single free 3½-inch bay, you also have the option of adding an internal tape drive and/or CD ROM drive, thereby saving both the dollars and the desktop space more costly externals require.

A software cache can perform as well as a caching hard disk controller in most business apps.

Inside, three ISA slots are available for sound cards or other new peripherals; the graphics accelerator and caching disk controller fill both VLB slots. One major complaint about this system's design: The free ISA slots could be more accessible. The VLB slots are on the left side of the motherboard, so cables from the caching controller must cross all the other slots on their way to the hard drive.

Netis backs this system with adequate service and support. You get a one-year warranty, but on-site service costs $120 a year. If you need to send the system in for repairs, the company promises to turn it around in two days. You can call Netis's tech support toll-free 10 hours on weekdays and on Saturday.

Still, with performance this hot and a price this low, you'll probably be able to forgive a few shortcomings in design and service. If you're looking for an outstanding combination of price and performance in a desktop PC, this Best Buy Netis is just right.

Polywell Poly 486-66EV

VITAL STATISTICS

Direct price: $2995
PROS: Fast performance, EISA/VESA motherboard, very good support
CONS: Above-average price
Contact: Polywell Computers, 800/999-1278, 415/583-7222
Reader service no. 626

In review after review, direct vendor Polywell gets consistently high marks for value. This month's entry, the midsize Poly 486-66EV tower, is based on a versatile AIR EISA/VESA motherboard that incorporates a 238-pin ZIF CPU socket and a total of eight 32-bit EISA slots. Three of these EISA slots have VESA extensions, allowing you to take advantage of local bus video cards, drive controllers, and network adapters in typical workstation configurations. Or you can set up the Poly 486-66EV with EISA peripherals and use it as a server. Of course, providing an EISA/VESA motherboard is not the cheapest way to go, as the $2995 price indicates.

Configured with a 256K secondary cache (upgradable to 512K)

Your software programs were barely speaking. Then something clicked.

If you're tired of playing matchmaker to software applications (even ones from the same vendor), you'll be pleased to hear this. There is a product that does it for you, now. Prodea Synergy™ makes the programs you already have, and what you've built with them, work together. A few points and clicks, and applications will exchange just about everything but valentines.

Mr. R. Lee Allen of Schering-Plough, a company already using Prodea Synergy, put it less romantically although no less enthusiastically. "It's not like anything out there before. It's more than OLE or DDE. It transcends both languages and APIs."

Drag and drop the icons, connect them with arrows. Data flows automatically.

You should also know that what you build is easy to pass on to others, without worrying about hot links, paste links or file location. Prodea Synergy runs under Windows™, costs $495 and has a 30-day guarantee. For a limited time you also get a $200 introductory cash rebate. Call us at 1-800-PRODEA-1. Your software programs will never look at one another the same way again.

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Circle 149 on reader service card

and VESA peripherals, the 486-66EV is a spirited performer—virtually tying the AcerPower 486v for fifth place overall. The 2MB Promise DC-4030VL caching disk controller contributes to that performance, as does the Orchid P9000 VLB graphics adapter (which packs an impressive 2MB of VRAM and 1MB of DRAM). Polywell also provides a 245MB Quantum hard disk.

From its handsome case with a hinged floppy-drive cover to its clean, accessible interior, the system is well put together. One VESA and four EISA slots are free, and any free VESA or EISA slot will also accept an 8- or 16-bit ISA card. All slots are full-length. With one internal and three externally accessible drive bays free, there's enough expandability for a small server or a demanding desktop application. And only one of the four RAM sockets is filled—with a single 8MB SIMM.

Service and support include a hefty 24-month warranty along with an additional 36 months of repair free of labor charges. On-site service is $75 for the first year, and the toll-free, responsive, accurate tech support is available during normal business hours and on Saturday. This is not the least expensive PC here—no EISA/VESA system is likely to be a price leader. But if you want a fast, well-constructed PC with maximum 32-bit versatility, the Poly 486-66EV is a great choice.

Tangent 486

VITAL STATISTICS

Direct price: $2966
PROS: EISA plus VL bus slots, good database performance, fine service
CONS: Above-average price
Contact: Tangent Computer, 800/800-6060, 415/342-9388
Reader service no. 627

Some systems distinguish themselves with their excellence, some with their deficiency. Then there are systems that aren't bad by any means but aren't outstanding enough to earn a Best Buy. This system from Tangent is planted firmly in that middle ground.

It's not that the Tangent is slow or ridiculously pricey. Its overall performance is average. Thanks no doubt to its caching drive controller, the system did best in tasks that required fast disk access, such as the database and software development segments of BAPCo. The system's price isn't outrageous either, although it exceeds the $2800 average price for this review's PCs. Buyers get Tangent's fine support, with a year of free on-site service and a promised one-day turnaround for depot repairs. The toll-free support line operates 11 hours a day on weekdays and Saturdays, and technicians answered our calls accurately, if not always quickly—callback times varied from 30 minutes to 3 hours.

What sets this system apart is expandability. The motherboard comes with one EISA slot, two slots that can take either EISA or VLB cards, and five 16-bit ISA slots. Both EISA/VLB slots are occupied, one by the SCSI drive controller, which connects to a 244MB Seagate hard drive, the other by the Diamond Stealth video board. Finally, the motherboard has a 238-pin ZIF socket, so you're assured of upgradability beyond the DX2-66 that sits there now.

Unfortunately, expansion options aren't enough to win our Best Buy nod. If you want a system with adequate speed now and plenty of room for future growth, this one might be worth considering. But if you want something that really stands out from the crowd, we advise you to look at one of our Best Buys.

Toptek Top486DX2/66

VITAL STATISTICS

Direct price: $2185
PROS: Low price, roomy interior
CONS: Uneven support package, partially unsupported motherboard
Contact: Toptek, 415/564-3500
Reader service no. 628

San Francisco, open your Golden Gate and see what veteran local assembler Toptek has to offer. This 486DX2-66 excels in both price and expandability, featuring the third best price in this review overall and the lowest price of any of the local clones. Expandability is good: The 238-pin ZIF socket promises a future upgrade path, and five free full-length 16-bit ISA slots give you room to add expansion cards. In addition, three free bays are externally accessible.

The Top486DX2/66's performance was just what you'd expect from a fast 486—safely ensconced in the middle of the pack, with stronger scores on Windows applications. While unbound cables crisscross the motherboard, creating a cluttered feeling common in the PCs we see from small suppliers, you can still reach all necessary components. Unfortunately, Toptek installed the motherboard without supporting it all the way to the edges, leaving the VESA local bus socket extensions for the 16-bit slots and the ZIF CPU and RAM sockets unsupported. The cable clutter is purely a matter of aesthetics; the motherboard installation is a more serious issue. While we've seen much worse examples, all motherboard parts subject to insertion stress should be supported to prevent damage.

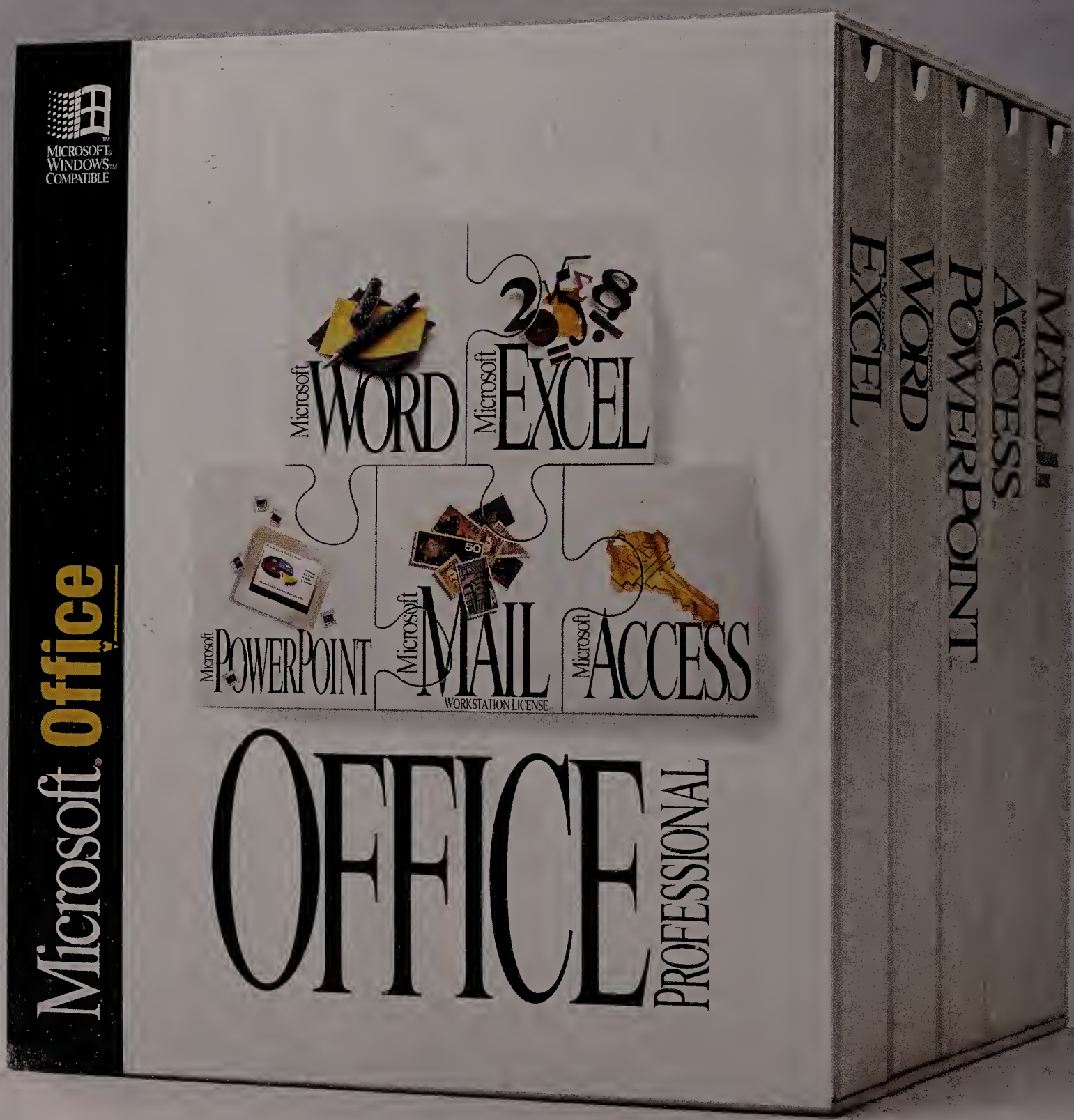
Depot repairs from this San Francisco–based company take just one day, and on-site service is without charge if you're within San Francisco city limits. Otherwise, you pay an exorbitant $75 per hour, which makes depot repairs look all the more attractive. While Toptek's technicians answered our calls promptly, a technician gave up on our toughest question and told us to bring the unit in for repair—an unusual and unnecessarily cumbersome solution to the problem. (All questions we ask can be answered over the phone.)

Still, here's another example of a local kid making good in the big city. Toptek gives you the bottom-line essentials. As with most of these locally assembled PCs, you won't see much of the polish that you expect from large national vendors, such as comprehensive service and support packages or elegant system design, but San Francisco buyers who can live with a few rough edges will get a terrific, expandable system for a great price. **Continued on page 178**

IN 1990,
MICROSOFT INTRODUCED
WINDOWS 3.0,
AND PCs HAVE NEVER
BEEN THE SAME.

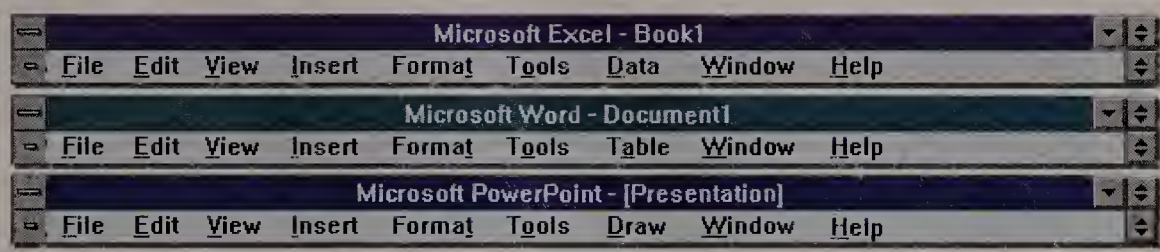
NOW HISTORY
REPEATS ITSELF.

INTRODUCING THE MICROSOFT OFFICE. A WHOLE NEW WAY TO WORK.



You asked for programs that work more like you do. And the new Microsoft® Office delivers on a level that software never did before.

We've gone right to the core of all our renowned programs for Windows™ and evolved them into a single, intelligent, effortless working environment. Now you can focus on your work, not your computer.



These menus from Microsoft Excel, Word and PowerPoint demonstrate a design consistency you'll also find in our toolbars, dialog boxes, and buttons.

You've helped us create all the best innovations.

The Microsoft Office couldn't have happened without a lot of concrete feedback from you. We've studied how you work and used your suggestions to develop great computing solutions. In our usability lab, 15 full-time scientists constantly watch how people use our products. In fact, we've tracked over 1.5 million user actions to understand just how you work with your computer.

Click on any icon in the Microsoft Office Manager and it instantly moves you from one program to another.

That's why Microsoft consistently pioneers better ways to work. And the new Microsoft Office continues in the tradition that brought you toolbars, wizards, automatic functions, and a lot more. Now your 100 most common tasks can be done in one step.

Working as one.

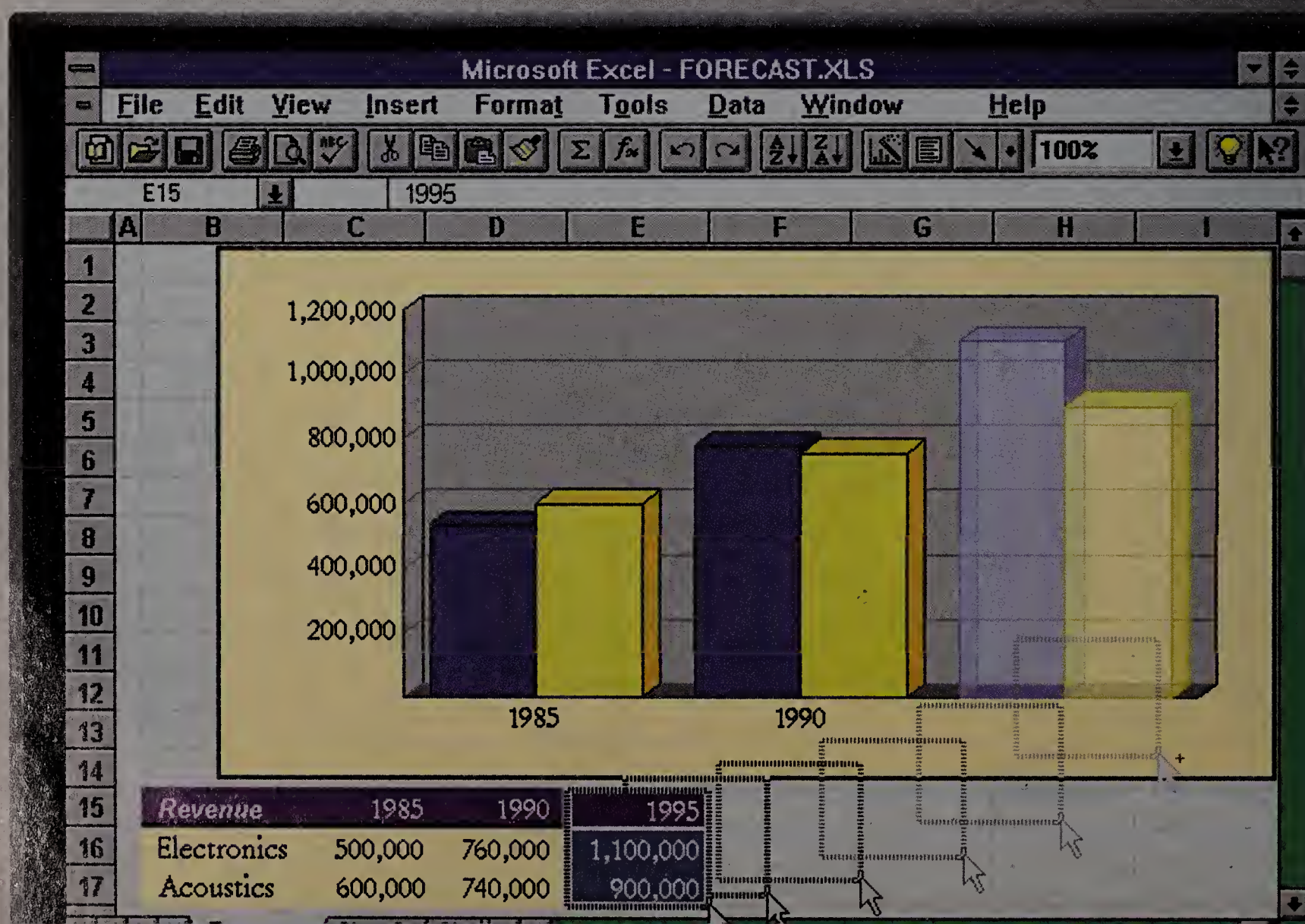
One of the main things you told us was that you want programs which look and work alike. So we made it happen.

For example, in the new versions of Microsoft Excel, Word and PowerPoint®, eight of the nine top level menu commands are the same.

And that's only the beginning. You can install the Microsoft Office in one integrated step and use the same shared tools like Microsoft Graph, WordArt and Spelling checker across all the programs. And the intuitive Microsoft Office Manager (MOM) makes it easy to use all these innovations together.

The Microsoft Office family of programs is the most popular office suite for the Windows and the Macintosh® operating sytems because it's built from the ground up by one company with one cohesive design philosophy. It all adds up to a whole new way to work.

ONLY THE MICROSOFT OFFICE HAS INTELLISENSE. BUILT-IN INTELLIGENCE THAT UNDERSTANDS WHAT YOU NEED AND HOW TO DO IT BEST.



With the Microsoft Office, IntelliSense™ technology has arrived. IntelliSense recognizes what you want to accomplish, adapts to the personal way you work, and delivers intelligent results. Now repetitive jobs are automatic, complex jobs are easier, and your computer is working much smarter.

SHip teh cartons friday.

Ship the cartons Friday.

The AutoCorrect feature in Word fixes typos as you make them. Automatically.

The basics are automatic.

Most everyday routines that you have to do, just to get to the real work, now happen automatically.

The exclusive AutoCorrect feature in new Word 6.0 instantly fixes typos as fast as you make them. That's one less thing to think about.

AutoFormat analyzes your document, instantly picks a format (or allows you to customize one) and makes your work look great.

In new Microsoft Excel 5.0, you can use the innovative AutoFilter to look quickly at different parts of your data, with the click of your mouse.

And the Drag and Plot feature lets you add a new row or column of data to your charts by simply dragging the information there. What used to take a number of steps now happens in one.

The TipWizard in Microsoft Excel tracks the way you work and offers bright ideas on how to save time.

Pictured at left, the Drag and Plot feature in Microsoft Excel enables you to update your chart instantly with new data. Just drag the new data and drop it into your chart.

Guiding. Informing. Thinking ahead.

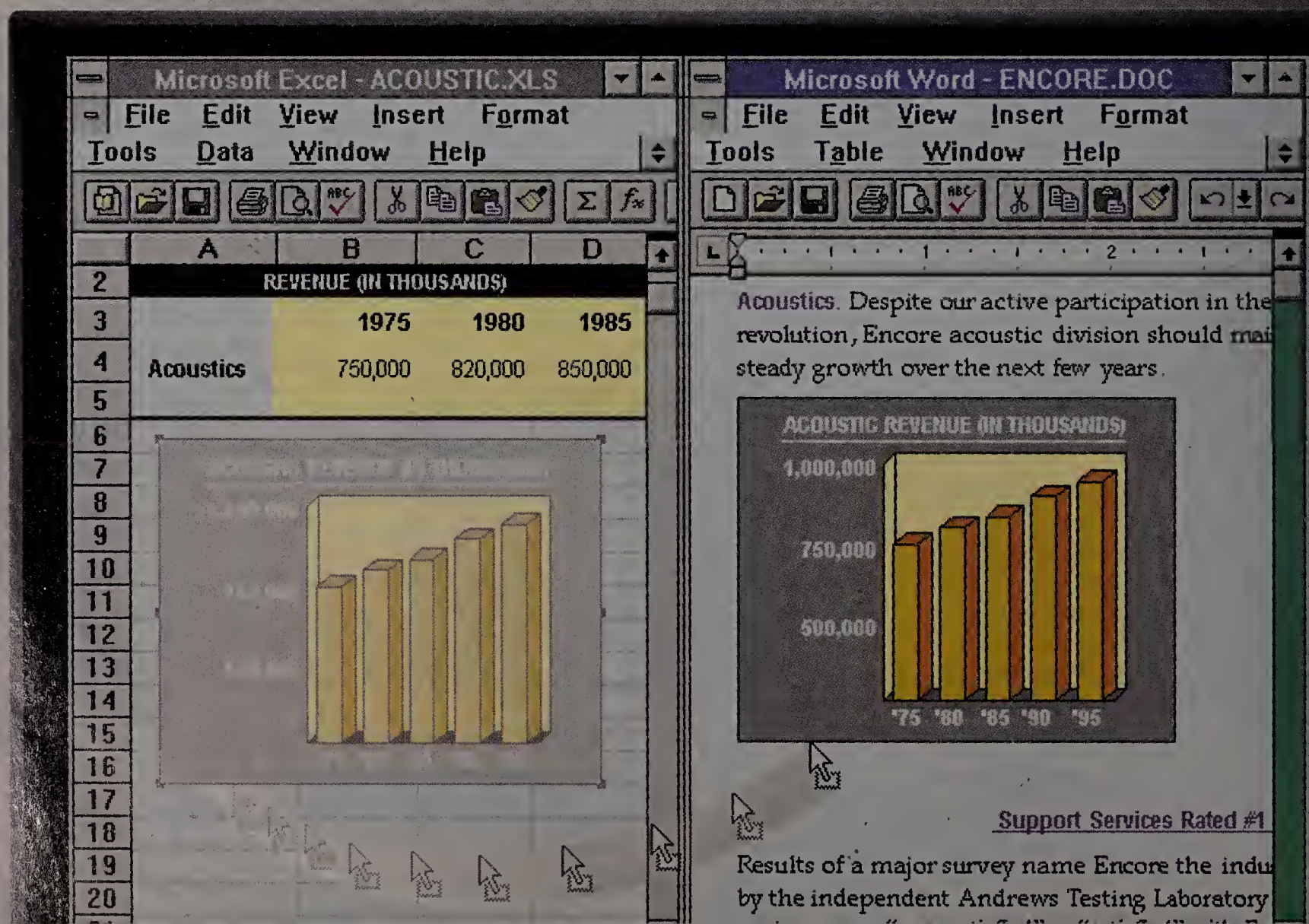
IntelliSense technology also means you have wizards and Cue Cards that inform you and guide you easily through more complex jobs like charting, designing presentations, customizing form letters, and creating data entry forms.

For instance, the TipWizard in Microsoft Excel observes how you work. Based on your individual patterns, it gives you tips on new ways to finish tasks with less effort. There's no easier way for you to discover how to reduce steps and save time. And avoid a trip to the manual.

The PivotTable Wizard guides you through building summary tables of your data. Now you can drag and drop your headings, then view and analyze your work from every angle.

The powerful engineering in IntelliSense could only happen through our commitment to your ideas and to turning them into solutions you need. And only Microsoft can bring this much great thinking together all in one place.

ONLY MICROSOFT HAS OFFICELINKS. NOW IT'S SIMPLE TO SHARE DATA BETWEEN PROGRAMS WITHOUT LEAVING YOUR DOCUMENT.



New OfficeLinks makes it simple to share text, data, and graphics between programs, and lets you put them all together in the same document. You asked for innovation, and this delivers in a big way.

At the heart of OfficeLinks is

With OfficeLinks, it's effortless to mail merge your Microsoft Access data into a Word document. Lower right: Routing lets everyone in your workgroup share comments and information.

the latest Object Linking and Embedding technology (OLE 2.0). It's an open industry standard that helps everything in the Microsoft Office work together, even with software from other companies.

Drag and Drop between programs. Instantly.

Here's what moving information between documents is like: Drag a chart from Microsoft Excel and drop it into Word. Job done.

Hit the "Present It" toolbar button in Word, it'll automatically transfer your work to new PowerPoint 4.0 for an instant presentation.

Link data from Microsoft Access® with your Word document and you've got personalized letters for your entire customer base. Fast.

The end of jumping between applications.

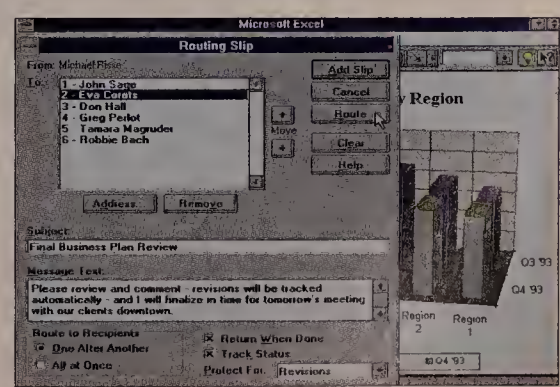
OfficeLinks lets you edit in place. In one place. Maybe you have a Microsoft Excel chart in the Word memo you're writing. And you need to change some figures. Click on the chart and instantly have all your spreadsheet tools to make the changes. Without ever leaving your Word document.

We call it Visual Editing. And once you've seen it in action, you'll understand just how integrated the Microsoft Office is. Moving, sharing and editing data between applications has changed forever.

Together in every way.

The Microsoft Office is bringing workgroups together, too. Your whole group can manage and edit documents as a team. Use the Routing feature to forward your draft, collect comments and merge the results.

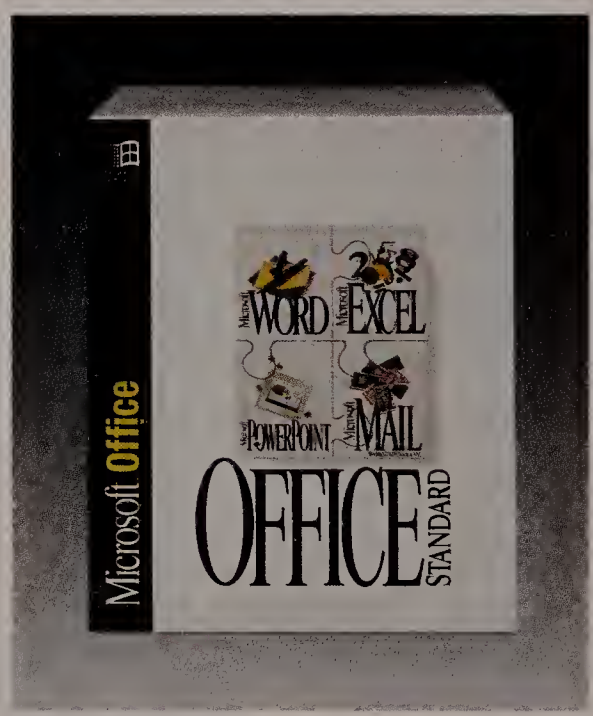
Only the Microsoft Office lets you share files and macros between the PC and Macintosh. And through Visual Basic™ for Applica-



Pictured at left, sharing data between programs is as easy as dragging it from one and dropping it into the other.

tions, the new Microsoft Office provides a powerful development platform for custom solutions.

GET THE NEW MICROSOFT OFFICE FOR $259. YOUR PC WILL NEVER BE THE SAME.



Until December 31, through a special offer for Microsoft customers, you can upgrade to Microsoft Office Standard edition, featuring Word 6.0, for $259. That's more than 30% off what you'd pay for these programs separately. If you're currently using competitive programs, get the Trade-up for only $299.*

SPECIAL UPGRADE OFFER

MICROSOFT OFFICE STANDARD EDITION VERSION UPGRADE $259
If you are a licensed user of any program in the Microsoft Office family*

MICROSOFT OFFICE STANDARD EDITION TRADE-UP $299
If you have a competitive spreadsheet, word processor, presentation graphics or database program

If you act now, you'll automatically get Microsoft Excel 5.0 and PowerPoint 4.0 upgrades at no extra cost as soon as they're released.**

The Microsoft Office Standard edition includes Microsoft Excel, Word, PowerPoint and a Mail workstation license. For just $149 you can add the award-winning Microsoft Access database to your Office.

So it's a great time to get into this whole new way to work.

FOR THE NAME OF YOUR LOCAL RESELLER OR TO ORDER BY PHONE, CALL (800) 894-6642.

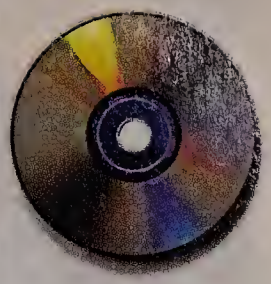
Microsoft® Office

MICROSOFT WINDOWS.

*To qualify for the version upgrade of Microsoft Office Standard edition, you must be a licensed user of at least one of the following members of the Microsoft Office family: Microsoft Excel, Word, PowerPoint presentation graphics program or Microsoft Access database management system. **Getting the Microsoft Office Standard edition version Upgrade or Trade-up entitles the user to Microsoft Excel 5.0 and PowerPoint 4.0 versions upon their release. Offer good only in the 50 United States. Offer expires December 31, 1993. Reseller prices may vary. In Canada: for information only, call (800)-563-9048. Outside the U.S. and Canada, call your local Microsoft subsidiary or (206)-936-8661. © 1993 by Microsoft Corp. All rights reserved. Microsoft, Microsoft Access and PowerPoint are registered trademarks, and IntelliSense, Visual Basic, Windows and the Windows logo are trademarks of Microsoft Corp. Macintosh is a registered trademark of Apple Computer, Inc.

High performance 486™DX2. Blazing 66MHz, backed by our exclusive turbo cache, for unparalleled workstation performance.

Two Full-length ISA Slots. Connections are everything. And this machine allows for plenty—Ethernet, video, you name it.



Optional Built-in 5.25" CD ROM. The medium with capacity for video clips, graphics, photo CDs, or an entire set of manuals.

PCMCIA Expandability. The T6600C offers a huge wealth of communication and expansion options, including a 16mm PCMCIA 2.01 compliant slot large enough for a hard drive!

Built-in Stereo Speakers. Quality audio adds another dimension to any program. With Microsoft® Microphone™ included, your work can speak for itself.

A technological tour de force that actually tours.

Take your entire show on the road. The new Toshiba T6600C Series represents the most advanced technology and muscle we've ever put into a portable. With its 486™DX2 processor, dual ISA full-slot expansion, and huge storage options, the T6600C Series delivers the power and capacity for the most demanding portable applications. From network analysis to software development to full-blown multimedia, if you need to tour with a great deal of force, this is your system.

Feel the force. **For your nearest dealer, call 1-800 457-7777.**

The New T6600C Series

- Intel 486™DX2/66MHz
- 8MB RAM expandable to 40MB RAM
- 10.4" color active matrix TFT-LCD screen
- SVGA display with 640x480x256 color resolution
- 510MB HDD
- Two full length 16-bit ISA slots
- One 16mm PCMCIA 2.01 compliant slot
- Built-in SCSI with external SCSI-II port
- Microsoft® Sound System™
- 5.25" half height 200ms double speed CD-ROM (T6600C/CD and T6600C/CDV models only)
- MediaShare®Mambo™ DVI®/Ethernet™ board (T6600C/CDV model only)

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Circle 228 on reader service card

Unisys PW2 Advantage 4666

VITAL STATISTICS

Direct price: $4299
PROS: Excellent customer service, 525MB hard drive
CONS: High price, second slowest performance scores
Contact: Unisys, 800/874-8647, 215/986-4011
Reader service no. 629

Like NCR, Unisys made its name selling direct to big businesses—that means systems backed by great service at top dollar. Second in price only to the NCR, this unit costs $4299.

For the money, Unisys gives you a one-year warranty with free on-site service and 12 hours a day of toll-free weekday tech support. Questions were answered knowledgeably and promptly.

Unfortunately, beyond service, Unisys has little to offer that the average business buyer couldn't find elsewhere for less. The system's 525MB Seagate hard drive is terrific, but that's about it for standout features. You get 8MB of RAM (upgradable to 64MB) and a 256K secondary cache. Graphics are controlled by an integrated S3 805 chip, which drives a 14-inch Unisys monitor. The CPU is seated in a 238-pin non-ZIF socket.

Overall performance is less than ordinary. While its scores in our Paradox and WinWord tests were actually slightly above average, it was the second slowest system overall, 13 percent slower than the average 66, and *the* slowest Windows system here. Even if you need the best service possible, we recommend you consider one of the less expensive members of our Best Service and Support top five.

ZDS Z-466X+ Model 340

VITAL STATISTICS

Direct price: $2827
PROS: Strong service and support, beautiful design, 340MB hard drive
CONS: No free drive bays
Contact: Zenith Data Systems, 800/553-0331, 708/808-5000
Reader service no. 630

You can count on a terrific service and support package from ZDS: toll-free tech support 16 hours a day, free on-site service, 2-day repair turnaround, and a 30-day money-back guarantee. And ZDS technicians know what they're doing—they answered all our test questions promptly and knowledgeably.

ZDS quality shines through in system design as well. Just open the Z-466X+ lid and feast your eyes on the clean motherboard layout—a welcome change from units whose interiors are strewn with cables. ZDS's integrated local bus video helps keep the interior tidy and leaves room for five free 16-bit expansion slots. What appears from the outside of the case to be a free drive bay is actually occupied by the generous 340MB Western Digital hard drive. Since no drive bays are free in this configuration, you'll have to buy a pricey external unit if you want to add a tape or CD ROM drive. Or you could purchase the combo floppy drive option and free up one bay.

ZDS uses the newer 4¼-ineh SIMM sockets and populates two of the four with 4MB SIMMs, leaving two free for expansion. A ZIF socket connects the motherboard to a daughtercard, which contains a second ZIF socket and CPU—an interesting design that keeps the motherboard compact and leaves all components accessible.

Considering the excellent service and design, the $2827 price looks quite reasonable. Performance was respectable, and the unit ran 10 percent faster than the average 486DX2-66 on our Windows tests. If super service, top design, and a rock-solid vendor mean more than cheapest price or fastest performance—and you can live with the drive bay limitations—ZDS just may have your PC.

Zeos 4DX2-66

VITAL STATISTICS

Direct price: $2932
PROS: 540MB hard drive, good database performance, Lotus software bundle
CONS: Above-average price
Contact: Zeos Int'l, 800/554-5220, 612/633-4591
Reader service no. 631

In our historical database of pricing, test results, and configuration information, some DX2-66s find their way to the top or the bottom of our charts, while others—like this Zeos—land in the middle.

In fact, the Zeos's performance *exactly* matches the overall average for DX2-66s we've seen lately. It's better for Windows than for DOS, judging by the BAPCo scores, although it shone in the database section, finishing 16 percent faster than the average DX2-66

The system's $2932 price tag is higher than most, but you get your choice of one of several Lotus applications, including 1-2-3 and Ami Pro. The cleanly laid-out motherboard holds 8MB of RAM, a 256K secondary cache, and enough free slots and bays to accommodate most expansion plans. In addition there's a one-year warranty, a 30-day money-back guarantee, toll-free tech support, and a 3-day turnaround policy for factory repairs. When we called the Zeos tech support hot line, hold times ranged from 5 to 15 minutes, and our questions were answered well.

So what stands out about this system? On the positive side, toll-free tech support is available 24 hours a day, the capacious 540MB Seagate hard drive is larger than all but one other system's, the motherboard has a 238-pin ZIF CPU socket, and the Diamond Viper VLB graphics accelerator card is fast. Zeos charges a reasonable $49 annually for on-site service. If a well-designed system from a proven mail-order vendor appeals to you, this system is a good option. However, if you're looking for the best overall value in this review, check out one of our Best Buys instead.

Computer Square Is the Hottest of the Hot 486DX2-66s

	Word for Windows 2.0	Excel 4.0	Freelance for Windows 1.0	Paradox 3.5 in DOS window	BAPCo SYSmark92
Computer Square Patriot PCN1	104	82	110	135	192
Netis N4D266*	108	90	122	123	196
Diamond DT 486DX2-66*	98	75	123	131	172
Axik Ace Cache 486DX2-66V	99	78	125	113	167
AcerPower 486v*	99	81	112	127	163
Polywell Poly 486-66EV	100	80	127	126	170
ALS 486DX2-66 LB	107	91	139	134	194
Gateway 4DX2-66V*	102	78	102	127	153
NEC Image 466	100	84	111	139	166
Micro Express MicroFlex-VL/66	104	85	137	118	167
Tangent 486	109	98	149	120	166
NCR System 3000 Model 3333	99	83	120	132	142
Compaq ProLinea 4/66	117	92	118	121	150
Zeos 4DX2-66	99	93	124	141	149
Toptek Top486 DX2/66	105	88	123	140	147
Acma 486/DX2 VESA System	107	88	146	175	162
ZDS Z-466X+ Model 340	105	89	118	139	137
CAF VL DX2-66	124	99	140	131	156
Blackship BLK 486 DX2/66 LB*	114	97	131	153	146
Acer Acros 486DX2/66	131	100	133	151	149
Jet Research Jet Algo 486DX2/66	124	99	134	157	144
Compudyne SCI4DX2-66	108	88	140	156	125
Unisys PW2 Advantage 4666	114	111	153	151	138
Magic Box Power VESA 486DX2-66	116	97	159	164	120

*Best Buy

Systems are arranged in order of overall speed, from fastest at top to slowest at bottom. Test results are in seconds (lower is better) except for the BAPCo results, which are given in number of scripts executed per hour (higher is better).

Methodology
All tests were run using systems configured with 8MB of system RAM. We tested using either DOS 5.0 or DOS 6.0, depending on which version the vendor sent. If we had to install Windows, we performed the default installation. We configured Windows on each system with a Hewlett-Packard LaserJet III as the default printer, disabled Print Manager, and attached a null printer to LPT1. Using vendor-supplied video drivers when provided, we set the resolution to 800 by 600 pixels in 16 colors. On systems unable to support 16 colors, we used 256. Finally, we loaded the test applications, test files, the scripts necessary to automate testing, and Microsoft Test (automation software).

Word for Windows 2.0
We use the spelling checker and scroll through a 27-page document; create, format, print, and save a single-page business letter; and open a business proposal, add a paragraph, then preview and print it.

Excel 4.0
We perform several data extracts; build and format a financial statement and print it; and open a mortgage analysis, scroll, move blocks, change the interest rate, print-preview the statement, and save it.

Freelance for Windows 1.0
We load a single-page starter file (built from a standard template included with Freelance) containing a U.S. map with each state as a separate object. Then we enter preformatted text on the page in preset headings, add a second page, and enter text as bulleted items. We add three more pages, each containing a single 3-D bar chart, and import data from a WK1 file. Next we add a sixth page containing four 3-D pie charts and preview a slide show using a vertical-louver fade effect between slides. We apply various views to the presentation and preview the slide show four more times, applying a different fade effect between slides each time. Finally we save the presentation to disk.

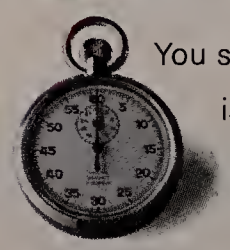
Paradox 3.5 in DOS window
We perform a variety of data entry, record searching, and updating tasks. Then we generate reports against a simple customer list.

BAPCo SYSmark92
We run a scripting program that loads common database, desktop publishing, presentation graphics, software development, spreadsheet, and word processing applications and executes a variety of typical tasks with each. The following software packages are used: PageMaker 4.0, dBASE IV 1.1, Harvard Graphics 3.0, 1-2-3 3.1, Microsoft C 6.0, Excel 3.0, Word for Windows 2.0, Paradox 3.5, Quattro Pro 3.0, and WordPerfect 5.1.

Data based on tests designed and conducted by the PC World Test Center except the BAPCo SYSmark92, which is an industry-standard test designed by the Business Application Performance Corporation. All rights reserved.

Wai
sec

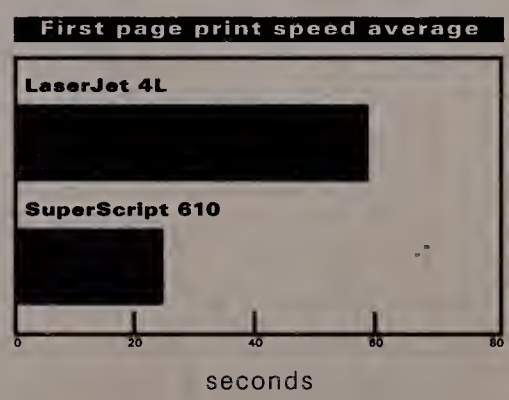
If you have to wait much longer to print, you need



You see, the NEC Silentwriter SuperScript 610 is the only laser printer that begins printing the second you press "Print." So there is absolutely no waiting. And the only laser printer with a first page print speed that's three times faster than the HP® LaserJet® 4L.

The first Windows™ printer.

In fact, the SuperScript 610 is a whole new way of printing. That's because it's the only personal laser printer that directly interfaces with Windows. So it's as upgradable as your PC. That means as your PC gets better, so does your printer. In fact, this printer will print exactly what you see on your screen. Fonts, DOS applications, everything. And at less than $700 it's an even better value than you thought.



Based on 486-66 MHz PC with 8MG RAM. Average speed based on printing one-page documents from word processing, spreadsheet, presentation and graphics applications.
Silentwriter is a registered trademark of NEC Corporation and SuperScript and FastFacts are trademarks of NEC Technologies, Inc. All other trademarks are property of their respective owners. © 1993 NEC Technologies, Inc. NEC GSA# GS00K91AGS5241.

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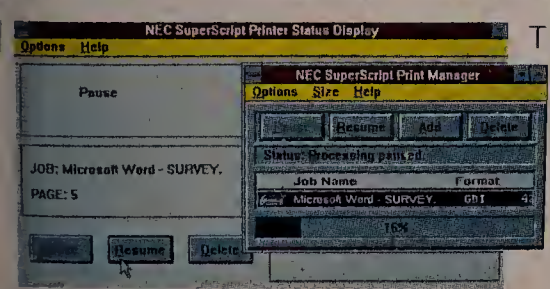
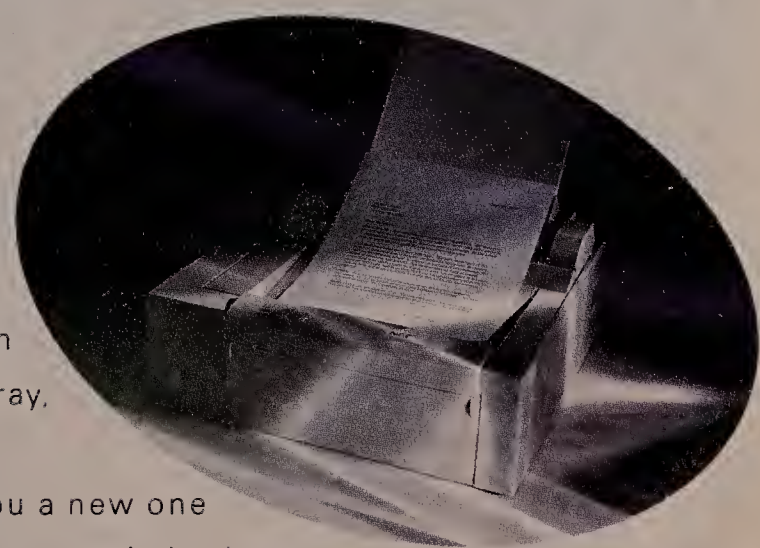
a Silentwriter® SuperScript™ 610.

See what's happening, while it's happening.



The SuperScript 610 even sends an on-screen status display to your PC that tells you exactly what's going on. So screaming, cursing and kicking your printer are no longer necessary.

And it comes with a 2-year replacement warranty. So, if by some remote chance your SuperScript 610 runs into bigger problems than an empty paper tray, have no fear.



We'll get you a new one overnight. If you can wait that long.

For more information on this exciting new technology, call 1-800-NEC-INFO. Or via fax, call NEC FastFacts™ at 1-800-366-0476. Request document #SW610.

NEC

Circle 205 on reader service card

FEATURES COMPARISON

These Local Bus 486DX2-66s Come Fully Loaded

● Yes
○ No
n/a= not applicable

	BEST BUY AcerPower 486v	Acer Acros 486DX2/66	Acma 486-66/DX2 VESA System	ALS 486DX2-66 LB	BEST BUY Axik Ace Cache 486DX2-66V	Blackship BLK 486DX2/66 LB	CAF VL DX2-66	Compaq ProLinea 4/66 Model 240/480/w	Compudyne SC14DX2-66	Computer Square Patriot PCN1 486DX2/66
Standard features										
Selling price as of 7/93[1]	$2449	$2349[2,3]	$2495	$2267	$2698	$1995	$2762	$2769	$2611	$2999
238-pin CPU-upgrade socket	●	●	○	○	●	●	○	○	●	●
ZIF socket	○	○	○	○	●	●	○	○	○	●
Installed/maximum RAM (MB)	8/64	8/68	8/32	8/256	8/32	8/64	8/32	8/32	8/32	16/32
Secondary cache installed/maximum (K)	256/256	64/256	256/256	256/512	256/256	256/1024	256/256	0/0	128/256	256/256
Externally accessible drive bays/number free										
3½-inch	1/0	1/0	0/0	1/0	2/1	2/1	2/1	1/0	0/0	1/0
5¼-inch	3/2	2/1	4/2	3/2	3/2	2/1	2/1	1/0	3/2	2/1
Expansion slots/number free										
32-bit EISA	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
32-bit VLB	2[7]/1	2[7]/2	2[7]/0	2[7]/0	2[7]/0	2[7]/0	2[7]/0	0/0	1[7]/0	2[7]/0
16-bit	6/6	2/1	5/5	6/5	5/4	3/3	5/4	3/3	5/5	5/4
8-bit	0/0	0/0	1/0	0/0	0/0	2/2	0/0	0/0	0/0	0/0
Hard disk	340MB Western Digital Caviar 2340	250MB Conner CP30254	250MB Conner CP30254	214MB Seagate ST3243A	245MB Quantum ProDrive LPS	245MB Quantum ProDrive LPS	345MB Maxtor 7345AT	245MB Quantum ProDrive LPS	245MB Maxtor 7245AT	345MB Maxtor 7345A
Drive adapter	integrated IDE chip	integrated IDE chip	OEM IDE card on VL bus	DC-680T IDE card on VL bus	Promise DC-4030VL IDE card on VL bus	OEM IDE card on VL bus	Promise DC-4030VL IDE card on VL bus	integrated IDE chip	integrated IDE chip	DC-680 IDE card on VL bus
Caching controller RAM (MB)	n/a	n/a	0.5	2	1	n/a	4	n/a	n/a	1
1.2MB/1.44MB drives	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
Graphics adapter	Acer VGA LA526 card on VL bus	integrated Cirrus Logic GD-5426 chip	Orchid Fahrenheit card on VL bus	Diamond Stealth 24 VLB card on VL bus	Diamond Viper card on VL bus	Color Designer AVGA3B card on VL bus	Paelit Cirrus AVGA card on VL bus	integrated Tseng ET4000/W32 chip	Diamond Viper card on VL bus	OEM card on VL bus
Graphics adapter memory	1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM	2MB VRAM	1MB DRAM	1MB DRAM	1MB DRAM	2MB VRAM	1MB DRAM
Monitor	Acerview 56L	Acerview 34T UVGA	Mag MX15H	ADI MicroScan 3G	ADI MicroScan 3E+	KFC CK-1420N	CAF/CN-1470	Compaq 461	Mag MX15F	ViewSonic 15
Screen diagonal (inches)	15	14	15	14	14	14	15	14	15	15
Case style	compact	compact	tower	desktop	tower	minitower	desktop	compact	compact	desktop
Power supply maximum output (watts)	200	145	250	200	250	250	200	146	200	250
Ports: parallel/serial/mouse/SCSI	1/2/1/0	1/2/1/0	1/2/0/0	1/2/0/0	1/2/0/0	1/2/0/0	1/2/0/0	1/2/1/0	1/2/0/0	1/2/0/0
Service and support										
Warranty (months)	12	12	12	12[10]	12	12	12	36	12	12
On-site service price for first year	free	free	free	$227	free	free	n/a	free[12]	free	$225
30-day money-back guarantee	●	●	●	○	●	●	●	○	●	●
Turnaround policy (days)	3	3	3	1	2	2	2	2	1	2
Toll-free support number	●	●	●	○	●	●	○[14]	●	●	●
Weekday hours	14	14	10.5	9	12	9	10	24	12	8
Weekend support	●[15]	●[15]	○	○	●[15]	○	○	●	○	●[15]
BBS	●	●	●	○	●	●	●	●	●	○
Fax	●	●	●	●	●	●	●	●	●	●

[1] All systems include super VGA and color monitor, two floppy drives, a keyboard, a mouse, DOS 5.0 or 6.0, and Windows 3.1; they are otherwise configured as specified. Selling price is either direct or the average price based on calls made to multiple dealers.

[2] Includes 9600/2400-bps fax-modem.

[3] Includes Microsoft Works for Windows, Microsoft Productivity Pack, Intuit, Eclipse Fax for Windows, and online service starter kits.

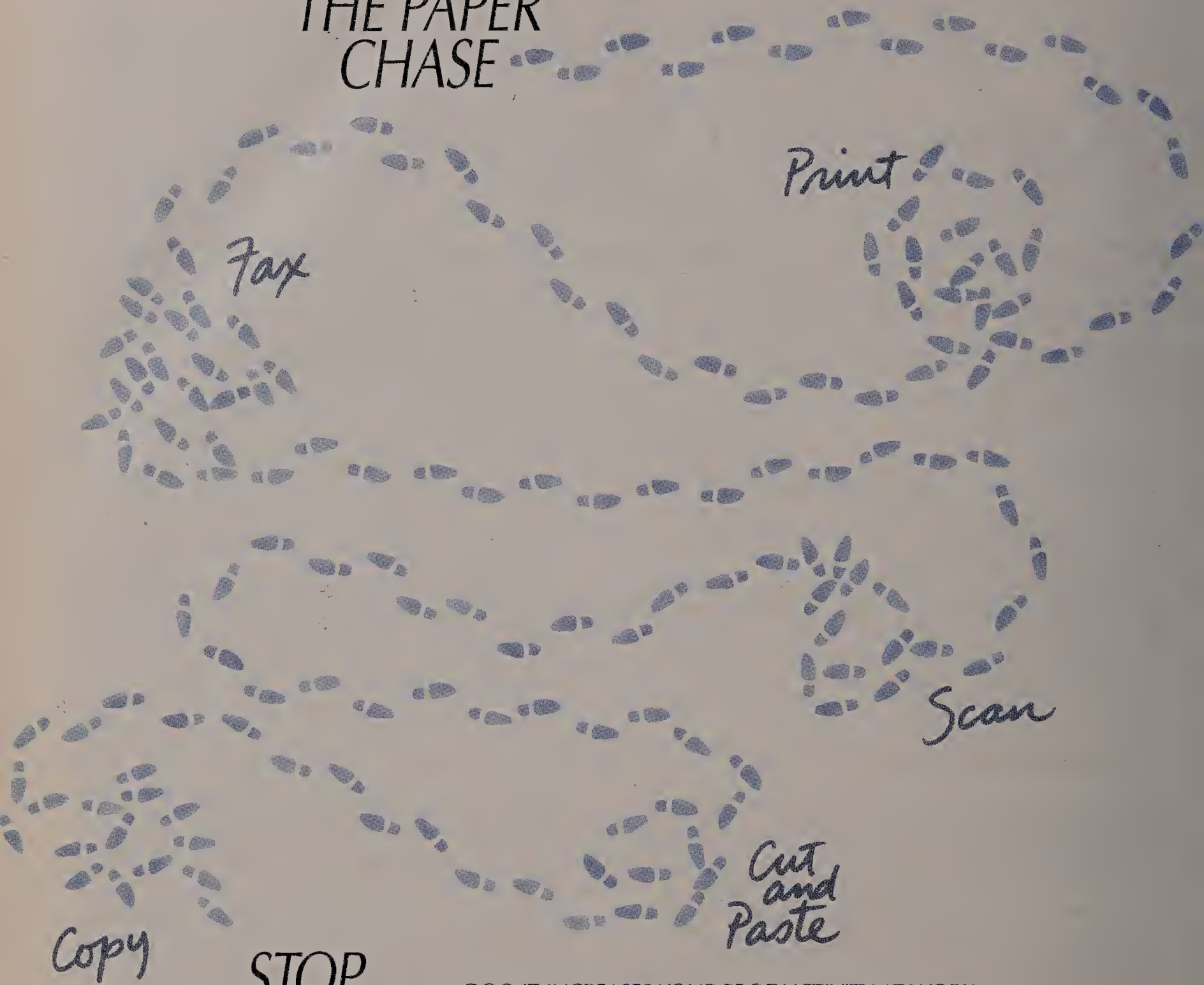
[4] Includes CD ROM drive, 16-bit SCSI adapter, Microsoft application, DOS utilities.

[5] Includes CD ROM drive.

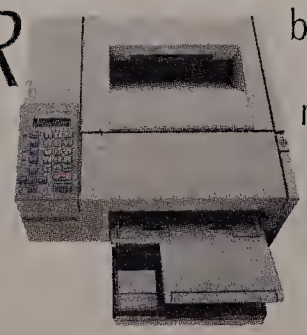
ST BUY	BEST BUY						BEST BUY						
Diamond DT 486DX2-66	Gateway 4DX2-66V	Jet Research Jet Algo 486DX2/66 Local Bus System	Magic Box Power VESA 486DX2-66	Micro Express MicroFlex-VL/66	NCR System 3000 Model 3333	NEC Image 466	Netis N4D266	Polywell Poly 486-66EV	Tangent 486	Toptek Top486DX2/66	Unisys PW2 Advantage 4666	ZDS Z-466X+ Model 340	Zeos 4DX2-66
$2489	$3040[4]	$2329	$2895	$2499	$4785[5]	$3628	$2150	$2995	$2966	$2185	$4299	$2827	$2932[6]
●	●	○	○	●	●	○	●	○	●	●	●	○	●
○	●	○	●	○	●	●	○	●	●	●	○	●	●
8/32	16/64	8/32	16/32	8/32	16/64	8/64	8/32	8/256	8/128	8/32	8/64	8/64	8/64
256/1024	256/256	256/1024	256/1024	256/256	256/256	256/256	256/256	256/512	256/1024	256/256	256/256	256/256	256/256
2/1	0/0	2/1	2/1	2/1	1/0	0/0	2/1	2/1	2/2	2/1	1/0	2/0	2/1
3/2	3/1	3/2	3/2	3/2	2/1	2/0	3/2	3/2	3/1	3/2	3/3	1/0	2/1
0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	5/4	1/1	0/0	0/0	0/0	0/0
2[7]/0	2[7]/1	2[7]/0	2[7]/0	2[7]/0	2[7]/1	0/0	2[7]/0	3[8]/1	2[7]/0	2[7]/0	2[7]/2	0/0	2[7]/1
6/5	6/5	6/6	5/5	5/4	4/3	4/4	4/3	0/0	5/4	5/5	4/4	5/5	5/5
0/0	0/0	0/0	1/1	1/1	0/0	0/0	2/2	0/0	0/0	0/0	0/0	0/0	1/1
245MB Quantum ProDrive LPS	424MB Western Digital Caviar IDE	214MB Seagate ST3243A	213MB Maxtor 7213AT	340MB Western Digital Caviar 2340	540MB Conner CP30540	340MB Western Digital Caviar 2340	213MB Maxtor 7213AT	245MB Quantum ProDrive LPS	244MB Seagate ST3283N	245MB Maxtor 7245AT	525MB Seagate ST3600N	340MB Western Digital Caviar 2340	540MB Seagate ST3655A
DC-680 IDE card on VL bus	integrated IDE chip	OEM IDE card on VL bus	OEM IDE card on VL bus	Promise DC-4030VL IDE card on VL bus	NCR/ Adaptec SCSI card	integrated IDE chip	Promise DC-4030VL IDE card on VL bus	Promise DC-4030VL IDE card on VL bus	EISA-SC100 SCSI card	OEM IDE card on VL bus	integrated SCSI chip	integrated IDE chip	integrated IDE chip
2	n/a	0	n/a	4	n/a	n/a	2	2	2	n/a	n/a	n/a	n/a
1/1	0/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1
Diamond Viper card on VL bus	ATI Graphics Ultra XLR card on VL bus	Cirrus Logic graphics accelerator card on VL bus	OEM card on VL bus	Diamond Viper card on VL bus	Diamond Viper card on VL bus	integrated Tseng ET4000/ W32 chip	Genoa 8500VL card on VL bus	Orchid P9000 card on VL bus	Diamond Stealth 24 card on VL bus	Cirrus Logic graphics accelerator card on VL bus	integrated S3 805 chip	integrated Cirrus Logic GD-5424 chip	Diamond Viper card on VL bus
2MB VRAM	1MB VRAM	1MB DRAM	1MB VRAM	2MB VRAM	2MB VRAM	1MB DRAM	1MB DRAM	3MB VRAM[9]	1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM	1MB VRAM
CTX-CPS 1560 ProScan	Gateway CrystalScan 1572FS	ViewSonic 4E	AOC	Micro Express FM360	NCR	NEC MultiSync 4FG	ViewMagic CA 1464	Polywell MicroScan 3	CTX CMS-1461 MultiScan	ViewSonic 6E	Unisys 7033	ZDS ZCM-1430	Zeos SVGA
15	15	14	14	14	15	15	14	14	14	14	14	14	14
compact	desktop	tower	compact	minitower	minitower	compact	compact	tower	tower	minitower	compact	compact	desktop
200	200	230	230	230	200	110	230	230	200	200	200	145	200
1/2/0/0	1/2/0/0	1/2/0/0	1/2/0/0	1/2/0/0	1/2/1/1	1/1/0/0	1/2/0/0	2/2/0/0	1/2/1/1	1/2/0/0	1/2/1/1	1/1/1/0	1/2/0/0
15	12	12	12	24	36	36	12	24[11]	12	12	12	12	12
$75	free	$75/hour	$150	$50	free[12]	free[12]	$120	$75	free	free[13]	free	free	$49
●	●	○	○	●	○	○	●	●	●	○	○	●	●
2	○	1	2	2	3	7	2	3	1	1	○	2	3
●	●	○	●	●	●	●	●	●	●	○	●	●	●
9	18	9	24	24	24	12	10	9	11	9	12	16	24
●[15]	●[15]	●[15]	●	●	●	○	●[15]	●[15]	●[15]	●[15]	○	○	●
●	●	○	○	○	●	●	●	○	●	○	●	●	●
●	●	●	●	●	○	●	●	●	●	●	●	●	●

[6] Includes Lotus application of buyer's choice.
[7] Can double as ISA slots.
[8] Can double as EISA slots.
[9] 2MB VRAM plus 1MB DRAM for caching.
[10] Free labor for life of machine.
[11] Additional 36 months free labor.
[12] On-site service free for 36 months.
[13] Free within San Francisco city limits; otherwise $75 per hour.
[14] CAF expects to have toll-free support as of September.
[15] Saturday only.

TO WIN THE PAPER CHASE



STOP CHASING PAPER



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Circle 140 on reader service card

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Win a Diamond 486-66 PC

Have you ever contacted your PC maker for service and support? Or has your PC been trouble-free? Tell us about it! Fill out and fax in the questionnaire below—even if you have no problems to report—and we'll enter you in a drawing to win a Diamond DT 486DX2-66 PC, a Best Buy featured in this month's system review.

HOW TO ENTER: Fax your completed questionnaire, along with your name and phone number, to *PC World* at 415/267-1779. If you have trouble connecting to this number, fax your survey to 415/974-7404 or 415/442-1891. Do NOT fax a cover page. If you don't have a fax machine, you can mail your survey to Fax Survey, Box 11-SS, *PC World*, 501 Second St. #600, San Francisco, CA 94107. Send your survey in no later than November 30.

HOW TO FILL OUT THE FORM: FOR BEST RESULTS, PHOTOCOPY THIS PAGE; DO NOT TEAR IT OUT. Clearly print your name (use block capital letters) and your fax number at right; fill the appropriate circle for each digit of your daytime phone number. Then fill out the rest of the questionnaire. WHEN FILLING THE CIRCLES, AVOID GOING OUTSIDE THE LINES! One entry per person per month. Void where prohibited by law.

LAST, FIRST NAME

FAX NUMBER

ZIP CODE

Please fill in your daytime phone number below.

1	○	○	○	○	○	○	○	○	○	○
2	○	○	○	○	○	○	○	○	○	○
3	○	○	○	○	○	○	○	○	○	○
4	○	○	○	○	○	○	○	○	○	○
5	○	○	○	○	○	○	○	○	○	○
6	○	○	○	○	○	○	○	○	○	○
7	○	○	○	○	○	○	○	○	○	○
8	○	○	○	○	○	○	○	○	○	○
9	○	○	○	○	○	○	○	○	○	○
0	○	○	○	○	○	○	○	○	○	○

ABOUT YOUR PC

Who is the manufacturer of the PC you use most frequently?

○ Acer ○ Acma ○ ALR ○ Ambra ○ Apple ○ AST ○ Austin ○ Axik ○ Blackship ○ Canon ○ Compaq ○ CompuAdd ○ Compudyne ○ CompuTrend ○ Cornell ○ DEC ○ Dell ○ DTK ○ Epson ○ Everex ○ Gateway ○ Grid Systems ○ Hewlett-Packard ○ Hyundai ○ IBM ○ Insight ○ Leading Edge ○ Micro Express ○ Micron ○ MIS ○ Mitac ○ NCR ○ NEC ○ Northgate ○ Packard Bell ○ Panasonic ○ PC Brand ○ Samsung ○ Sharp ○ Swan ○ Tandon ○ Tandy ○ Tangent ○ Texas Instruments ○ Toshiba ○ Tri-Star ○ Twinhead ○ Unisys ○ USA Flex ○ Wang ○ Wyse ○ Zenith ○ Zeos ○ Other (specify): _____

Is this PC a...?
○ Desktop
○ Notebook/laptop
○ Hand-held

Is this PC a...?
○ Pentium/586
○ 80486
○ 80386
○ 80286
○ Other (specify): _____

Where did you purchase this PC?
○ Local dealer
○ Mail/phone order
○ Direct from field sales force
○ Membership discount store
○ Computer superstore
○ Home/electronics store
○ Retail store
○ VAR
○ Other (specify): _____

When did you buy this PC?
○ This month
○ 1–3 months ago
○ 4–6 months ago
○ 7–12 months ago
○ More than 12 months ago
○ Not sure

Would you buy this brand of PC again?
○ Yes
○ No

Do you use this PC at...?
○ Work ○ Home ○ Both

In terms of PC skills, would you describe yourself as...
○ Novice ○ Intermediate ○ Experienced

WHAT ARE YOU REPORTING?

○ A problem during the last month
○ An older problem not previously reported in this survey
○ No problems ever
○ No problems since last responded to survey

■ **If you're NOT reporting a problem, please fill out the Uptime Report (below).**
■ **To REPORT a problem, fill out the Problem Report (right column).**

UPTIME REPORT

How many consecutive months has your PC been trouble-free?

○ 3 months ○ 6 months ○ 9 months ○ 12 months ○ 15 months ○ 18 months ○ More than 18 months

■ **STOP HERE if you're not reporting a problem.**

PROBLEM REPORT

When you first received your NEW PC, was any component "dead on arrival"?
○ Yes ○ No ○ Don't know

If so, which one was it? (Check all that apply.)
○ Battery ○ CD ROM ○ CPU ○ Floppy drive ○ Graphics/video board ○ Hard drive ○ Keyboard ○ Memory ○ Modem/fax board ○ Monitor/screen ○ Motherboard ○ Mouse ○ Power supply ○ Sound board ○ Other

■ **For the following questions, describe your most recent HARDWARE-related problem with this PC.**

Did you contact the manufacturer for repair service or technical support?
○ Yes
○ No
○ Not sure

What was this problem finally identified as?
○ Faulty component
○ Incorrectly installed software
○ Wrong configuration
○ Faulty peripheral
○ Device conflicts
○ OS problem
○ Other
○ Don't know

If a component failed, which one was it? (Check all that apply.)
○ Battery ○ CD ROM ○ CPU ○ Floppy drive ○ Graphics/video board ○ Hard drive ○ Keyboard ○ Memory ○ Modem/fax board ○ Monitor/screen ○ Motherboard ○ Mouse ○ Power supply ○ Sound board ○ Other

How many times have you had a problem with this PC?
○ This was first time ○ Two ○ Three ○ Four ○ More than four

Did the problem occur under warranty?
○ Yes
○ No
○ Not sure

How recently did this problem occur?
○ This month
○ 1–3 months ago
○ 4–6 months ago
○ 7–12 months ago
○ More than 12 months ago
○ Not sure

How long after PURCHASE did this problem occur?
○ Less than 1 month
○ 1–3 months
○ 4–6 months
○ 7–12 months
○ More than 12 months
○ Not sure

■ **For the following questions, describe your most recent SERVICE or SUPPORT experience.**

What type of service/support did you receive?
○ Phone ○ On-site ○ In-store help ○ Express system swap ○ Express component swap ○ Factory return

If phone service, how long were you on hold?
○ Not at all ○ Less than 1 min. ○ 1–2 min. ○ 2–5 min. ○ 5–10 min. ○ 10–20 min. ○ More than 20 min.

How long did it take before you talked to the person who finally helped you?
○ Less than 1 hour ○ 1–24 hours ○ 1–2 days ○ 3–5 days ○ 1 week ○ More than 1 week

How long did it take to resolve the problem completely?
○ Less than 1 week ○ 1–2 weeks ○ 3–4 weeks ○ More than 1 month ○ Never resolved

Was the problem resolved to your satisfaction?
○ Yes ○ No

Based on the service and support you received, would you buy this brand of PC again?
○ Yes ○ No

On the whole, how satisfied were you with the service and support you received?
○ 1 Not at all ○ 2 ○ 3 Satisfied ○ 4 ○ 5 Extremely satisfied

How likely is it that you would recommend this brand of PC to a friend or colleague?
○ 1 Not at all ○ 2 ○ 3 Likely ○ 4 ○ 5 Extremely likely

PLEASE FAX TO 415/267-1779

Two w
make a

If patience is a virtue, it would be tough to find anyone more virtuous than a 386 user.

Of course, you're not waiting to be canonized. You just want to get your spreadsheet crunched, printed and e-mailed before your boss's boss calls you looking for it.

Now if you had a 486, you wouldn't have this problem. But all that wishful thinking goes out the window when you consider the double-knots on your company's purse strings.

Performance Benchmarks		
(figures indicate relative performance)	Intel i386	Cyrix 486 Upgrade
MS Excel 3.0	1.0x	2.1x
MS Word 2.0	1.0x	2.8x
Micrografx Designer 3.1	1.0x	2.6x
Benchmark tests run on IBM PS/2 Model 70/20MHz.		

The new Cyrix 386-to-486 Upgrade Microprocessor delivers application performance that's twice as fast. And that's twice as smart.™

Fortunately, there's a smarter alternativ to the downward migration path pictured above. It's called the 386-to-486 Upgrade Microprocessor.™ And it's only available from Cyrix,® the smarter microprocessor company

It's smarter because it's the only single chip upgrade solution of its kind. And as such, the most cost-conscious way to replac the pedestrian 386 computer you have, with the searing 486 power you want.

Our upgrade chip acts just like a 486, and with good reason. It has Clock Doubling, a 1K on-chip cache

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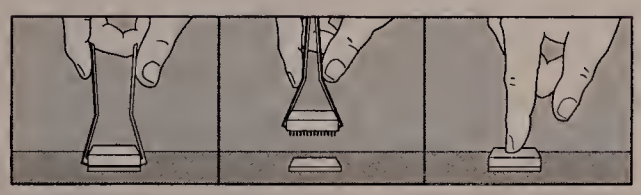
ays to 386 fly.

and enhanced Cx486 technology. Which means it delivers *twice* the application performance, and 100 percent compatibility with all your software. Like DOS, Windows and OS/2. Even Windows NT. It's also certified software compatible in Novell, Banyan and Lan Manager nodes.

MICROSOFT. WINDOWS COMPATIBLE

yes It runs with NetWare

What's more, it's easy to install (it takes all of 15 minutes), and costs under $400. So it's also easy to justify to even the stingiest bean counters.



Talk about immediate gratification. Just use the chip removal tool provided to pull out your 386DX chip (16, 20, and 25 MHz versions only at the moment), and plug our Cyrix Upgrade Microprocessor into the empty socket. Then get ready for screaming 486 power.

Every Cyrix upgrade chip comes with the reassurance of a limited lifetime warranty, toll-free telephone support, and a money-back guarantee.

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Call us directly at 1-800-46-CYRIX. Quick. Before your old 386 computer inadvertently takes flight.

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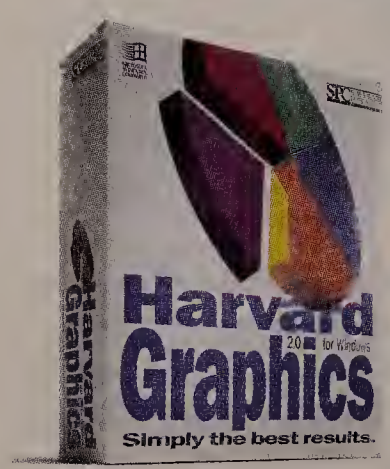
Circle 59 on reader service card

The first presentation
more than moving text

It's about moving people



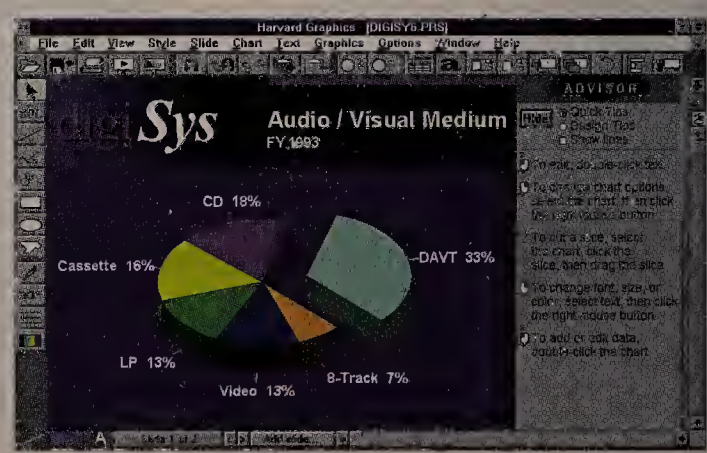
Harvard Graphics™ is about to change the world of presentations. Again. New Harvard Graphics 2.0 for Windows** is the first presentation software focused on what comes after the meeting, not just what comes before.

Of course Harvard Graphics 2.0 for Windows is easy to use. In fact, it's easier to learn, easier to use and has more powerful features than any other presentation product you care to compare it to.

But ease of use, more features — that's not enough. Results are what really count. After all, what's the point of creating a presentation in 20 minutes if you lose your audience after 20 seconds?

With Harvard Graphics 2.0 for Windows, you'll get the results you want from every meeting, discussion, proposal and presentation.

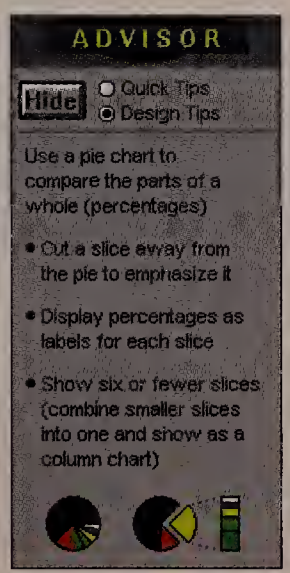
The Harvard Graphics Advisor's Quick Tips (the vertical bar on the right) puts impact-increasing, action-inducing presentation tools within easy reach of your mouse. There's also a Five-Minute Coach available to speed you through the basics of creating better presentations.



software that's about and changing charts.

and changing minds.

To help you get the best results, we've put a presentation expert inside the program. It's called The Harvard Graphics Advisor.™ The Advisor is an on-screen advice system to help make your bullet points more targeted, your pie charts more tasteful and your bar graphs more impactful. For more help, you can even call our Advisor hotline, where graphics experts are standing by.



The Advisor's Design Tips make it easy to give your presentations that fit-and-finish look, even if you aren't a graphic designer.

In no time, you'll have output that works harder for you, without having to work harder to get it.

We'll also help you sell your ideas in the meeting, with speaker notes, on-screen highlighting and stunning special effects. We can even help you conduct meetings over your network, with our exclusive Conferencing feature.

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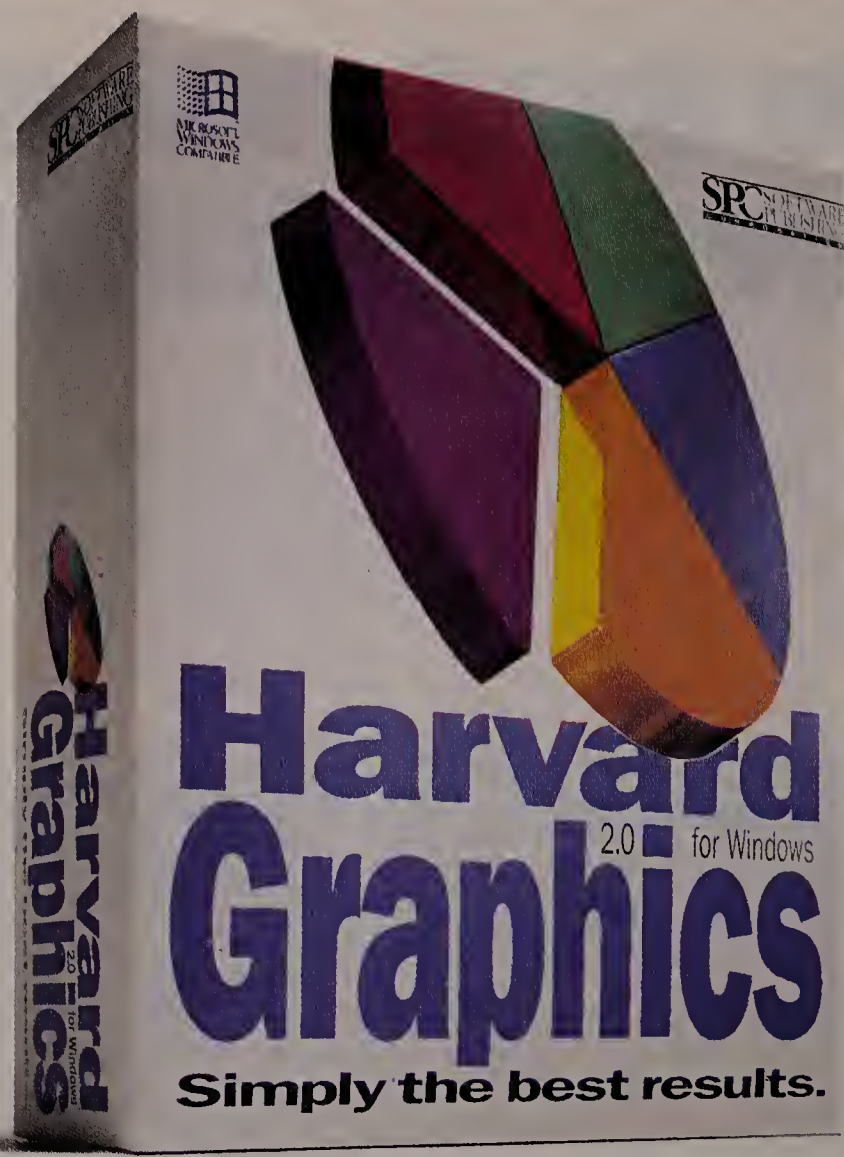

Upgrade your ability to get results for $89.

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Simply put, Harvard Graphics 2.0 for Windows represents a new standard in presentations. With more than 100 new enhancements, it's easier to learn, easier to use and has more results-oriented features than any other presentation software you are currently using...even Harvard Graphics.

Here's a sample of what's new in Harvard Graphics 2.0 for Windows.

New ease-of-use features.

Advisor Quick Tips-*helps you create and enhance your presentations quickly.*

Quick Looks-*shows options to you graphically, before you implement them.*

Customizable Icon Bar-*makes your most used features easier to get to.*

New results-oriented features.

Advisor Design Tips-*expert assistance to help you create high-impact charts.*

Harvard F/X™-*lets you add attention-getting text and drawing effects to enhance your message.*

Conferencing-*lets you convene meetings over existing networks for as many as 64 participants.*

Upgrade $89*

See your local dealer or call 1-800-336-8360, Oper. 962.

*$89 upgrade offer expires 12/31/93, $125 thereafter (all prices in U.S. dollars). Shipping and handling extra. Upgrade eligibility requires you to prove ownership of one of the following: Harvard Graphics® (any version), Harvard Draw,® Lotus Freelance Graphics,® Microsoft PowerPoint® (Windows only), WordPerfect® Presentations, Aldus Persuasion® (Windows only) or CorelDRAW® (Windows only). All SPC standard license requirements and restrictions apply. Void where prohibited.

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The Pleasures and Perils of Buying Locally

Mail-order firms and superstores get all the publicity, but local storefront shops survive against the odds. We sent a cadre of experienced shoppers to 25 local stores in California, Massachusetts, and Texas to see what keeps people coming back.

The masses are turning to mail-order firms and superstores for all their PC needs. It's not surprising, really, given the low prices, convenient hours, and comprehensive service plans these channels offer. But who says the majority is always right?

A relatively small but loyal group of shoppers is bucking the trend in favor of local dealers. These storefront shops should have gone under long ago, given the cutthroat competition in the PC industry. But against substantial odds, many of these local stores have hung on, an attractive alternative for buyers tired of the impersonal, ten-configurations-fit-all

By Roberta Furger

attitude of a good number of larger firms and a security blanket of sorts for those who want to be able to see what they're buying—and who they're buying it from.

For Techies Only?

But do you need to be a techie to buy locally? Must you sacrifice price for the security of dealing with someone down the block? Can a small local shop compete with the national firms when it comes to round-the-clock service and support? Those are just a few of the questions we sought to answer when we sent a small cadre of experienced shoppers to 25 local retail computer stores in three of the country's biggest PC markets: California, Massachusetts, and Texas. Their mission: To assess staff expertise, selection, price, and service and report back on their findings.

We shopped exclusively at stores that sell clones—either systems assembled in-house to the buyer's specifications, or preassembled units. We mainly visited independent storefront dealers, though we also shopped at a few value-added resellers (VARs), superstores, and home electronics stores. As you'd expect, price, selection, and the helpfulness of store personnel varied considerably. But at most stores, technical expertise of the sales staff was high. And although much has been made of the shakeout among local dealers, most of the stores we visited were in it for the long haul. Several had been in business for at least five years, and most seemed eager to do whatever it would take to keep a customer for life.

While the results of our shopping expedition can't be projected to every dealer in every town, they illustrate the benefits of buying locally as well as the inevitable trade-offs. To supplement our store visits, we put out a call to CompuServe users asking about their experiences buying locally. We got a modem full of responses, with dozens of shoppers sharing tales and offering advice.

A Matter of Choice

Helene Jaillet, an information broker in San Rafael, California, counts herself among the converts. She bought her new 486 locally for one reason: choice. A self-described tinkerer who wouldn't hesitate to pick up a screwdriver and pop open her computer's case, Jaillet says she assessed her needs, researched components, and knew exactly what she wanted in her new PC. Although some name-brand systems came close to her specs, "everything I looked at was missing at least one component," Jaillet recalls.

After striking out with the national brands, she decided to find a local store that could build a PC to her specifications. She contacted nearly two dozen dealers to get quotes for her "dream machine." Besides being able to put together exactly what she wanted (right down to the Orchid Fahrenheit video accelerator board), Jaillet says, her local dealer offered something no superstore or mail-order firm could: a one-to-one relationship—someone to advise her and assist in upgrades and repairs over the life of a product. "If you're buying a toaster, it doesn't matter where you get it, but when it's something you're going to be adding to and changing over time, you need to establish a local relationship," she notes.

Seeing Is Believing

Like Jaillet, many buyers go the local route to gain flexibility in choosing each component. But they point to other factors as well, among them the technical depth of the staff and the convenience and security of buying from someone nearby. "I can check out the operation, call local references, and see what I'm buying before I pay for it," says second-time clone buyer Dave Brodeur of Seattle.

To be sure, a few stores we visited were so unkempt and disorganized that most buyers would be put off, regardless of the prices or the staff's knowledge. We saw some gems too, such as Omni-Teq

Tips for Smart Shopping

Not sure where to start shopping or how to evaluate stores? Follow these tips from our veteran shoppers, and you're well on your way to picking the right store—and the right clone.

Do your homework. Before you visit any stores, figure out exactly what you want in your system and make a list of your choices.

Get recommendations. Attend a local PC user group meeting and ask members for advice. You might discover local stores that offer discounts to members. You'll also get an earful about which stores to avoid.

Follow the 5/15 rule. Make sure the store has been in business for at least five years and is no more than 15 miles from wherever you plan to use the PC. If the store has survived that long, it's likely to be around for another five. And if the computer goes down, you can get back to the store easily. Create a worksheet to compare the stores' attributes.

Keep your options open. Choose a store that will let you customize your system. That way you can have it built with, say, a faster video card while getting credit for a 1.2MB floppy you don't need.

Get it in writing. Make sure the store is willing to give you a firm price quote—on paper—for your specific system requirements. Have the salesperson itemize the components. Not only is the quote valuable for comparison shopping, it also means the store's willing to work hard for your business. Also ask for a copy of the store's policies on support, on-site service, standard and extended warranties, and money-back guarantees.

Don't be afraid to negotiate. Not every salesperson is willing to cut a deal, but if you don't ask, you'll never know. Start with, "If I buy now" (the phrase every salesperson

Computers, which builds systems to order at its three Houston-area stores and displays its handiwork in slick Plexiglas cases.

Personal service is where local dealers can really shine. But while most of the salespeople knew their stuff technically, the quality of assistance varied considerably among the stores we visited. At the Bit Bucket Computer Store in Sudbury, Massachusetts, for example, the salesperson asked a series of questions about usage and then recommended various options. He even spent time later answering follow-up phone questions about the suggested configuration. Compare that to the less-than-interested staffer we encountered at PC House, a dealer in Pasadena, California. Getting information from the salesperson there was about as difficult as getting the CIA to cough up its codes.

"If you're buying a toaster, it doesn't matter where you get it, but when it's something you're going to be adding to and changing over time, you need to establish a local relationship."

Helene Jaillet
San Rafael, California

Selection, too, varied considerably. Not surprisingly, the few superstores we visited had the widest choice, selling a variety of name-brand PCs, printers, and monitors in addition to house clones. But storefront dealers typically offered far more options for customizing. Clones at superstores were preconfigured, and while the store might install a different graphics board or a larger hard disk, you'd generally pay for the switch. For example, at Computer City, a Houston-area superstore owned by Tandy, the salesperson said he could swap out the Trident graphics card that came with the standard configuration, but he wouldn't deduct its price from the price of the PC, *and* we'd have to pay full price to get a different board installed. Most smaller stores were considerably more flexible, offering to swap parts in and out, depending on our preferences.

Service Limitations

But there is a downside to buying locally. Among the stores we visited, only a few offer a money-back guarantee (standard with most superstores and mail-order firms). Those that do offer the guarantee typically charge a restocking fee (as much as 20 percent) if you return the unit—hardly an incentive to take them up on the offer.

Similarly, technical support and repair options are more limited with local dealers. Although nearly every store we visited offers tech support, it is available during store hours only—usually 10 to 12 hours a day, six days a week. Compare that to the 7-day-by-24-hour technical support of many national firms. For some buyers, the limited availability of tech support could make the difference. Warranties are typically one year for parts and labor, compared to the multiyear warranties of larger brands (though one store offered free labor for the life of the product). Finally, none of the dealers we visited include on-site service as part of the standard service plan. Indeed, they charge handsomely for the convenience—up to $95 per hour.

But, says clone buyer Brodeur, when you buy locally, you don't have to deal with long-distance phone calls, the hassles of packing a unit up to send it back for repairs, and the high cost of shipping.

System pricing at most stores we visited was comparable to, if not better than, that of national mail-order firms or superstores. But at least half the stores didn't include DOS and Windows, which can add roughly $100 to the purchase price. Similarly, only one store bundled applications software—now standard with most retail and mail-order sales. A word of caution: A few stores appeared to be including pirated versions of DOS and Windows—loaded on the hard disk but unaccompanied by disks or manuals. So look for the certificate of authenticity with DOS and make sure you get all the related materials. In a similar vein, one store tried to swap out name-brand components with parts from

loves), "will you lower the price 5 percent?" Or, If you're a member, "How about a user group discount?" Many stores will throw in equipment—say, a mouse or more RAM—rather than lower the price.

Don't be swayed by incredible deals. We all love bargains, but you might find some stores offering pricing that's too good to be true. Be wary. You may be getting a used system or, even worse, a stolen one.

Check references. Ask your salesperson for at least three references, and then call them. If you visit the store on its busiest day—usually Saturday—you'll see customers bringing their PCs in for repair. Don't hesitate to eavesdrop on conversations.

Examine the merchandise. Have the salesperson crack the case before you sign for your purchase. Examine each component to guarantee you're getting what you paid for. Pay special attention to the brand of the hard disk (the most frequently switched item).

Get manuals for all components. If the store does go out of business, at least you'll know where to send the components if they need repair.

Make sure the software is legit. Verify that the store isn't passing on illegal copies of DOS, Windows, or other software. Ask if the software includes documentation, registration cards, and original packaging.

Run diagnostics software. Check your new system with a burn-in program for at least 72 hours, and check it again about a week before your warranty expires. That way, if disaster is about to strike, it will happen before the expiration date. (Try BurnIn, a shareware program available as BURNIN43-.ZIP on PC World Online and other BBS's.)

—Steve Bass

AT 9 A.M. HE DIDN'T KNOW HOW TO WORK WITH A DATABASE.

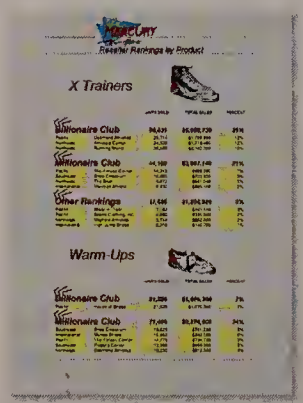
When Don Glor came to work on the morning of September 15,* he'd never used a database before. Two hours later he'd developed his first application — it looks like a fire truck; actually it's a customized inventory and billing management system for the South County Fire Department, San Mateo County, CA.

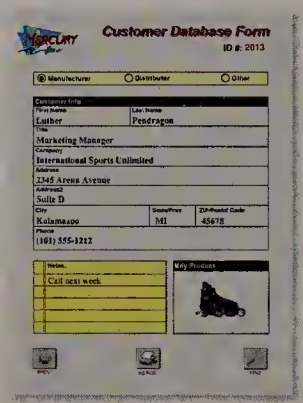
Don was using Lotus® Approach™—the only database designed for fire fighters. And lawyers and doctors and business people. And anyone who isn't necessarily a computer expert.

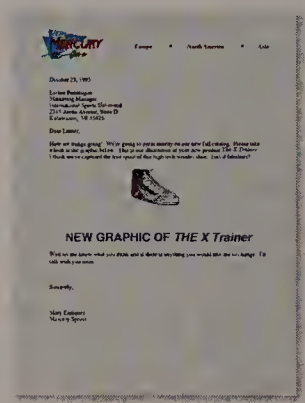
INTRODUCING APPROACH 2.1. THE RELATIONAL DATABASE ANYONE CAN RELATE TO.

All the power and functionality in the world is no good if you can't use it. Approach is expressly designed to be easy. There's no programming to learn. No endless documentation to study. And according to independent research, "The average Approach user produces real results with their database in 2 hours."†

This will surprise anyone who has tried to work with databases like Paradox® or Access.® According to Don, "I tried Access and shelved it. It was just too difficult to get a handle on." That's not surprising considering the 543 page supplemental language reference for programmers Don would've had to pore through. Which looks like light reading next to Paradox's 1300 pages of programming instruction.







Approach lets you get to work right away in familiar, easy to understand desktop items. You can generate reports, forms or form letters – you can even print mailing labels to match any specification.

The difference is that their products were not designed for general business users.

With Approach you have database power that really is accessible, and you work in one of four familiar, desktop items — reports, forms, mailing labels or form letters — that look and work just like you expect them to, to help you be productive right out of the box.

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Approach has won over 25 major industry awards and accolades.

AT 11 A.M. HE WASN'T SURE HOW HE'D EVER WORKED WITHOUT ONE.

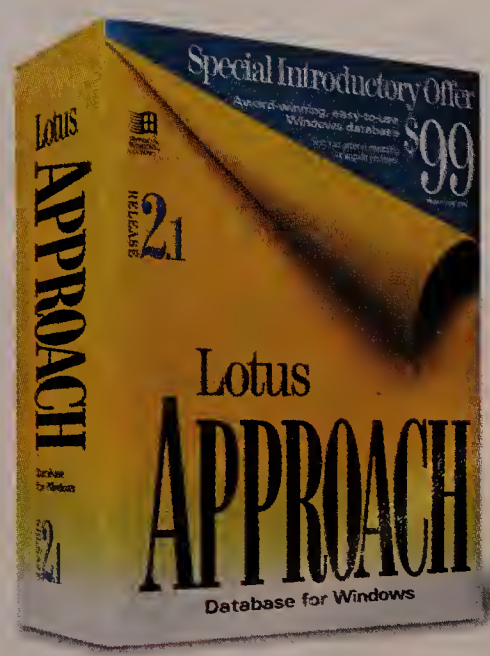
NOTHING THIS EASY HAS EVER BEEN THIS POWERFUL.

Just because Approach is easy to use doesn't mean it's not powerful. This is a fully relational client/server database that received a perfect 5.0 score from *PC Week Labs* in both "ease of use" and "performance."**

And with Approach, access to existing databases is only a mouse click away. Our PowerKey™ technology lets you work with dBASE,® Paradox, FoxPro,® Oracle® SQL, SQL Server and DB2®†† data in its native format. With no filters and no imports involved. Letting you transparently share data across multiple databases and all popular networks with unsurpassed speed and flexibility.

NOTHING THIS POWERFUL HAS EVER BEEN THIS AFFORDABLE – JUST $99.

For just $99*** you can experience the database that *PC/Computing* called "the most usable Windows™ relational database ever."††† But, this great introductory price for new Approach 2.1 won't last forever. Call **1-800-TRADEUP, ext. 9106** today or visit your Lotus Authorized Reseller to take advantage of this limited time offer. And discover the powerful relational database expressly designed for end users. Like Don Glor. And you.



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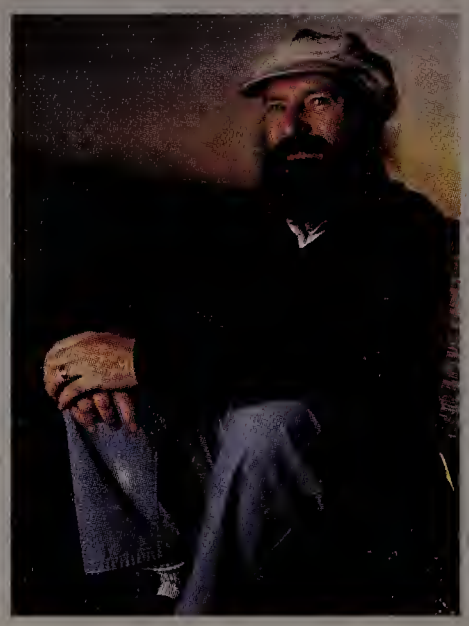
unknown manufacturers (we asked for a Creative Labs multimedia kit, for example, and got the store brand). So before you take your unit home, check each component and make sure you're getting what you paid for.

Ready to Shop? Be Prepared

Clearly, local stores can offer personal service that superstores and mail-order companies would be hard-pressed to match. Are the benefits of buying from a big company sufficient to justify forgoing the local option? That depends. Although staff at nearly every store we visited seemed capable of helping first-time and experienced shoppers alike, many buyers interviewed for this article cautioned that you must prepare and know your stuff to go the local route.



When you buy locally, you don't have to deal with long-distance phone calls, the hassles of packing a unit up to send it back for repairs, and the high cost of shipping.

Dave Brodeur
Seattle

"Learn as much as you can ahead of time," advises John Sulima of Westerly, Rhode Island, adding that buyers who aren't willing to do their homework should consider another channel. "Look elsewhere if you need a lot of hand-holding," adds another veteran shopper, who suggested that neophytes could get eaten alive. In fairness, we didn't encounter any sharks during our shopping expedition. But the more we let on that we knew about computers, the better the service—and the sweeter the deal.

Our advice? Weigh all the options—both the tangibles, such as price, system configuration, and support plans, and the intangibles, like the security of checking out the company you're buying from or the convenience of being able to load your PC into your car and drive it down the street when it needs an upgrade or a repair. Then assess your technical expertise and your technical appetite.

If you think a local bus is one that stops at every corner or if you would rather leave it to an expert to suggest the video board or hard drive that best meets your needs, then think about buying elsewhere. But if you value choice or place a high premium on knowing who you're buying from, a local store may be just the ticket.

Roberta Furger is a senior editor for PC World. *Contributing editor Steve Bass, freelance writer Paul Hutmacher, editorial intern Sarah Klein, and assistant editor Christina Wood contributed to this article.* ■

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With Apple GeoPort, you can turn your AV computer (in this case, the Macintosh Centris 660AV) into a telephone and an answering machine. The hands-free phone lets you do work on-screen while you talk. And both computers have ES·F2F software, so all you need is a video camera to hold a video-conference across a local area network.

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Forget the fax machine. The optional Apple GeoPort™ Telecom Adaptor includes fax and modem software—everything you need to send and receive faxes from your desk or use on-line services. And both computers let you try out ExperFax, an application that converts your faxes into text.

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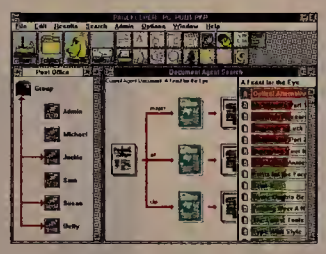

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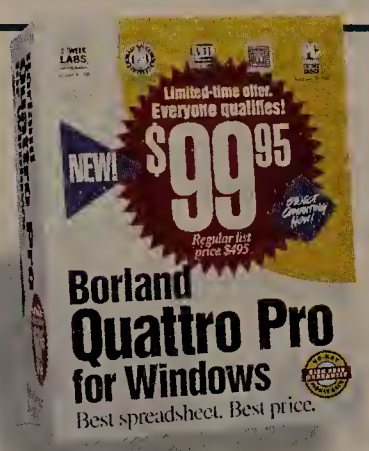

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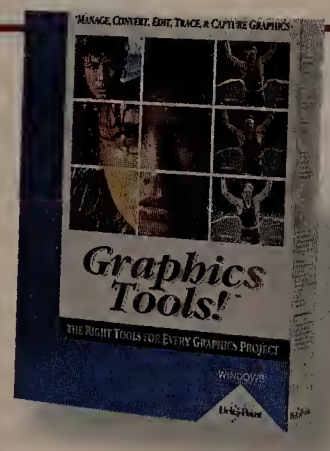

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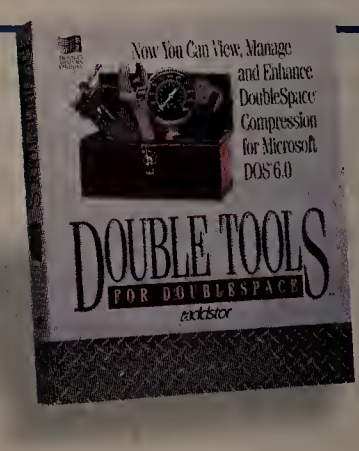

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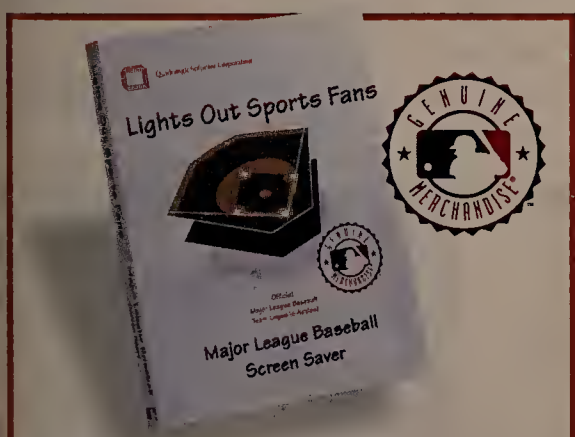

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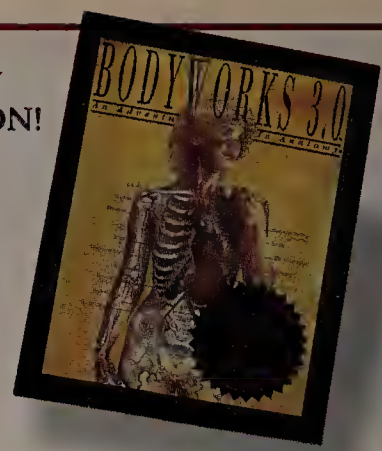

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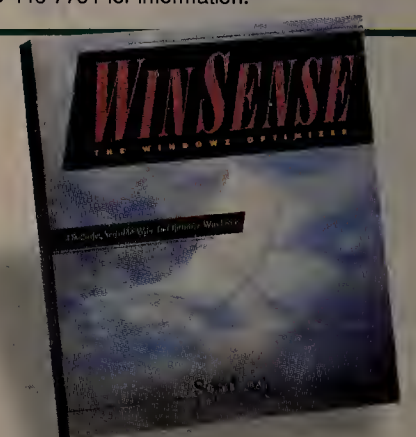

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Picking the Right Pieces

Wherever you buy, knowing how to judge the quality of PC components is the best way to pick a system for the long haul. Here's how to choose motherboards, memory, floppy and hard drives, and upgrade sockets that won't die before their time.

A personal computer, like a stereo system, is a collection of components. Whether you buy from a store that assembles PCs in the back room, order through the mail, go through an authorized Compaq or IBM dealer, or build one in your garage, getting the right parts is vital. In this article, we tell you what those components are and how to choose them. Remember, nothing guarantees a quality buy like an informed and picky shopper.

MOTHER KNOWS BEST

At the heart of any PC is the motherboard, a large circuit board that controls and runs the machine. The motherboard determines the type of computer; if you want a 66-MHz 486DX2 system with a VESA local bus, then you'll want a 486DX2-66 VESA motherboard. When you buy a national brand, such as Compaq or Gateway, the motherboard choice is made for you, but if a local store is building your PC, you can decide for yourself.

Your local clone store probably stocks motherboards from one or two manufacturers and can special-order others. If you like a particular store, there's a lot to be said for using a board that it stocks regularly. You'll get your system more quickly, you won't have to pay extra for a special order, the people assembling your computer will know the board, and if it's defective, replacements will be on hand. But don't underestimate the power of being picky.

By TJ Byers and Lincoln Spector

TERRY ALLEN

Should you power your generic computer, with a brand-name motherboard? Several companies, including Micronics, Mylex, and AMI, have built solid reputations by selling quality motherboards to clone shops. But for $150 to $350 less, you can buy a no-name motherboard that may be just as good. Of course, if you don't know who built your motherboard, you won't get technical support from the manufacturer—something you may need if your store goes out of business. Companies like Micronics, Mylex, and AMI include technical support and warranties with their boards.

Expansion Slots

When you buy a graphics card or a SCSI adapter, you'll need some place to plug it in. That place is the bus, which contains expansion slots for various boards. Virtually all clone motherboards sport six to eight expansion slots, more than enough for any single user. The question is: Does your bus have the right kinds of slots?

There are three basic types of buses—ISA, EISA, and local—each with its own kind of slots (IBM's Micro Channel bus isn't offered in clones). Let's look at the three buses you'll have to worry about:

ISA Most of the cards available, from modems to I/O cards to SCSI adapters, are designed for the Industry Standard Architecture (ISA) bus. You don't have to worry about your motherboard taking ISA cards; the other buses can all take ISA cards as well as their own kind.

EISA The Extended Industry Standard Architecture was designed as a faster, more capable version of ISA. An EISA card in an EISA slot can send data to and from the motherboard at half again the speed of an ISA card in either slot. Most EISA motherboards have a combination of EISA and plain old ISA slots and cost $200 to $400 more than equivalent ISA motherboards.

Are they worth it? In the real world, EISA cards improve performance only where ISA is too slow for the job. Unless you plan to buy a huge hard disk with a high-speed SCSI caching controller, you'll probably never pump enough data through a single board to make EISA a good buy.

Local bus On the other hand, if you're buying a 486 to run Windows, a local bus motherboard is a good buy. Local bus cards connect directly to the CPU, giving you better performance than ISA or EISA. Local bus video cards are common these days and can improve Windows performance considerably—something that hasn't happened with EISA. And besides, they're dirt cheap. There are two local bus standards, VESA and PCI, both of which coexist with ISA and EISA slots. Adding VESA slots to a motherboard can cost the manufacturer so little that it's not even reflected in the price. As we go to press, the PCI standard is too new to judge for price/performance; look for a local bus face-off in a future issue.

RAM

You need RAM—as much as you can afford now, with an easy upgrade path for when you can afford to buy more. If you plan to run Windows, 8MB of RAM will be sufficient—at least for the time being—although you'll find your programs will run faster if you have 16MB (and you properly allocate its use).

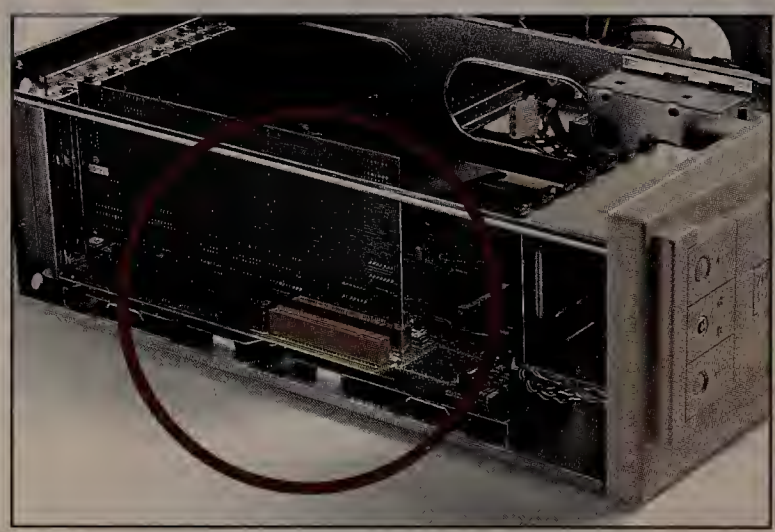
Virtually all motherboards sold today have sockets for the little easy-to-install memory boards called single in-line memory modules (SIMMs). Since a modern SIMM socket will take a 1MB or 4MB standard SIMM, upgrading is easy—at least in theory.

In practice, most motherboards won't let you mix 1MB and 4MB SIMMs, or they'll insist you mix them in a certain way. If you have eight SIMM sockets, each containing a 1MB SIMM, and you want to go beyond 8MB, you may have to throw away all your old RAM. Or you may get to keep four of your 1MB SIMMs and install four new 4MB ones. Before you buy, decide how much RAM you want, then buy the fewest SIMMs possible that total that amount. In other words, if you want 8MB, buy two 4MB SIMMs rather than eight 1MB—if your motherboard allows it. This will make future upgrades easier.

Memory Cache

You can improve performance using a memory cache, which is also called an external cache or secondary cache on a 486, where a primary cache is built into the chip. Like a disk cache, a memory cache keeps often-used data where it can be accessed quickly—in this case, in extremely fast static RAM (SRAM)—near the CPU. Why don't you simply use SRAM for your main memory? Because it's very, very expensive. Eight megabytes of SRAM would cost about $2400—and you wouldn't be able to buy it on a convenient SIMM, either.

How big a cache do you need? Common sense says the bigger the better, but experience tells us that ain't necessarily so. Tests done at the PC World Test Center in 1992 show that a 64K cache speeds up most user applications by about 14 percent and that a 128K or 256K cache doesn't give you much beyond that. In a few instances, the larger cache actually slowed things down. (The exception was dBASE IV, which ran approximately 10 percent faster with a 128K cache.) Network servers and 32-bit operating systems like Windows and OS/2 perform better with a larger cache.



LOCAL BUS SLOTS

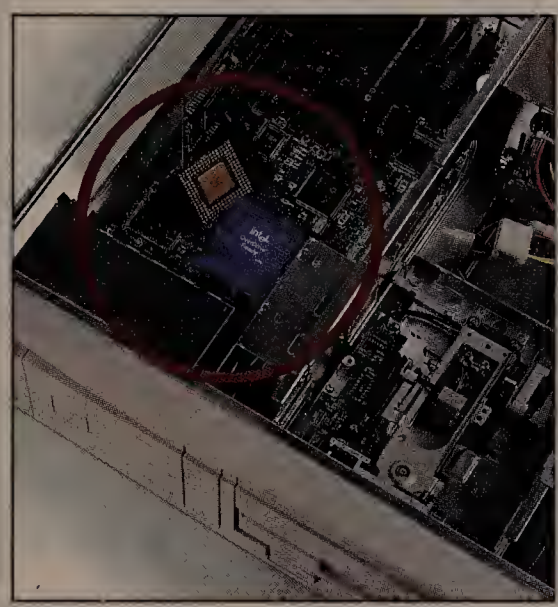
A local bus card in a local bus slot—like the VESA card pictured here—helps boost performance.

BIOS

Next to the CPU, the basic input/output system (BIOS) is the most important chip on your motherboard. The BIOS controls the keyboard, the floppy disk drives, and the basic video. A bad or out-of-date BIOS can make your life miserable.

For instance, the PC World Test Center recently discovered that some implementations of the AMI BIOS dated June 6, 1992, had a problem with Harvard Graphics 3.0 for DOS, resulting in very slow printer performance. Generally, such problem BIOS's can be updated without too much trouble.

In most modern computers, the setup program that lets you choose CMOS settings—basic configuration information that is stored in a battery-powered chip—is in the BIOS, and you'll want a broad selection of options. Time, date, and floppy and hard disk parameters are all pretty standard, but other features aren't. You may want to consider a BIOS with a setup program that lets you choose your NumLock's boot setting or disable the seeondary cache for troubleshooting. If you're security minded, password protection controlled from the BIOS prevents others from booting your system.



UPGRADE SOCKET A 238-pin Pentium OverDrive socket offers the possibility of a future CPU upgrade.

Upgrade Sockets

Only three things are certain in life: Death, taxes, and desire for a faster processor. At some point you're going to want to upgrade your CPU, preferably without buying a new computer.

Luckily, most 486 motherboards have upgrade sockets that let you add a faster CPU while keeping everything else intact. If you have a 486SX or 486DX, you can upgrade to the retail equivalent of a 486DX2, called an OverDrive. Many 486 motherboards come with special 238-pin upgrade sockets for an as-yet-unreleased chip that Intel is calling the Pentium OverDrive.

Upgrading a DX2 to the Pentium OverDrive requires a special socket. When we researched this article, we found many dealers weren't sure whether their motherboards had this socket or not. We were often assured it was there, only to discover that only an OverDrive for an SX or DX socket was in evidence. The 238-pin socket is a whole lot bigger than the one used for 486s, including the one already on the board, so you can identify it visually.

What's more, not all PCs with a 238-pin socket will be able to run the Pentium OverDrive. The upgrade chip—which will not be a full-fledged Pentium—is expected to put out too much heat for many systems that have the socket.

To increase the chance that your motherboard will in fact be able to accept a Pentium OverDrive, you should check the location of the upgrade socket with respect to airflow. The source of the cooling air is the fan inside the power supply, so be sure to check that the CPU is in line with the ventilation holes in the cabinet and the power supply and that it's not blocked by either an adapter card or a disk drive. Remember that these chips require plenty of headroom, not only for airflow but also for cooling gadgets that fit on top of the chip. There's still no way for you to guarantee that your machine will take the Pentium OverDrive, but Intel has promised *some* sort of upgrade chip for all 238-pin sockets.

Tracer Wires

When you inspect the actual board, look for tracer wires—small wires that go from one part of the motherboard to another. Unless you are being offered the mother of all discounts, avoid tracer wires as you would a used car being pulled by a horse. These little wires mean one of two things: Either the board had defective circuits that were repaired, or it's a quick update of an old design. Either way, it's bad news.

PUTTING IT IN STORAGE

RAM is too expensive and too unstable for storing your programs and data. That's why there are hard disk drives and floppy disks, CD ROM drives, tape backup systems, and large-capacity removable storage devices.

You don't need all these on your system, but a hard disk and a floppy disk drive are the absolute minimum storage requirements. As hard disks grow larger, tape drives are becoming increasingly necessary; but since you can live without one, we'll omit them from this discussion.

Hard Disks

The hard disk is your PC's workhorse; it's where your programs and data live. Unlike the solid-state motherboard, the hard disk is a mechanical contraption with moving parts. This means two things: It suffers wear and tear, and it's comparatively slow. You spend more time waiting for your hard disk than for any other part of your computer.

There's another important aspect of hard disks: Like basements, they get full amazingly fast. For that reason, you want the biggest hard disk you can afford.

The smallest hard disk you should even consider is 200MB. While 120MB might satisfy your immediate needs, it'll frustrate you before you know it. The price difference between a 120MB and a 200MB disk is only $100—not enough to hassle about.

Hard disk interfaces have two common standards, and each handles different size disks. If you buy a hard disk smaller than 520MB, choose an IDE drive. They're inexpensive, fast, and have few compatibility problems. The drive and controller come as one unit, so there's no issue of whether the controller and drive are compatible. And IDE drives interface with the motherboard via a simple connector that you can buy on an inexpensive expansion card—if it isn't already built into your motherboard.

But for now, most drives with the IDE interface don't go beyond about half a gigabyte of storage, and that's where SCSI drives come in. SCSI drives can hold up to 2GB of data, and you can connect multiple storage devices (hard disk, CD ROM drive, and so forth) to a single SCSI adapter.

Of course, SCSI comes with its own set of problems: While a SCSI drive costs about as much as a comparable IDE drive, you'll also have to buy a separate adapter—and those fast enough for a hard disk cost from $150 on up. (A good rule of thumb: If a SCSI adapter will fit in an XT-style 8-bit slot and can't transfer data at 5MB per second or faster, it's not good enough to control your hard disk.) To complicate things further, DOS can't access SCSI drives without special drivers. Finally, you can't always daisy-chain multiple SCSI devices as promised; the SCSI standard is so fragmented that only careful shopping or blind luck will get

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Unlike most other color printers, the BJC-600 has 4 separate ink cartridges — one for each color. So when you run out of one color you don't have to replace all the others.

Finally, at less than $649*, the Canon BJC-600 color printer will save you money right from the start.

To get the name of your nearest Canon dealer, call 1-800-848-4123. Because now that you know the facts in black and white, it's time to see the BJC-600 in color.

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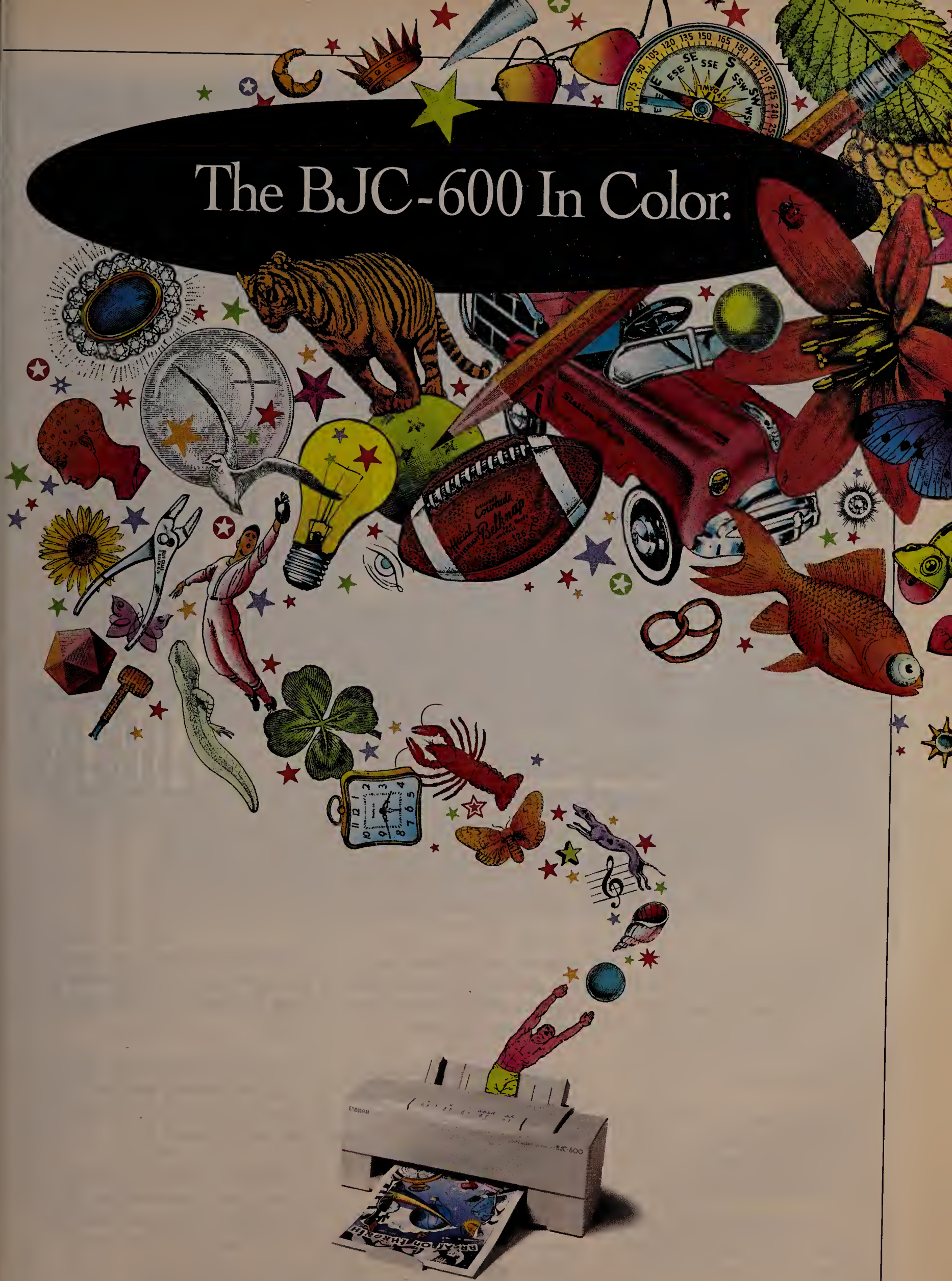
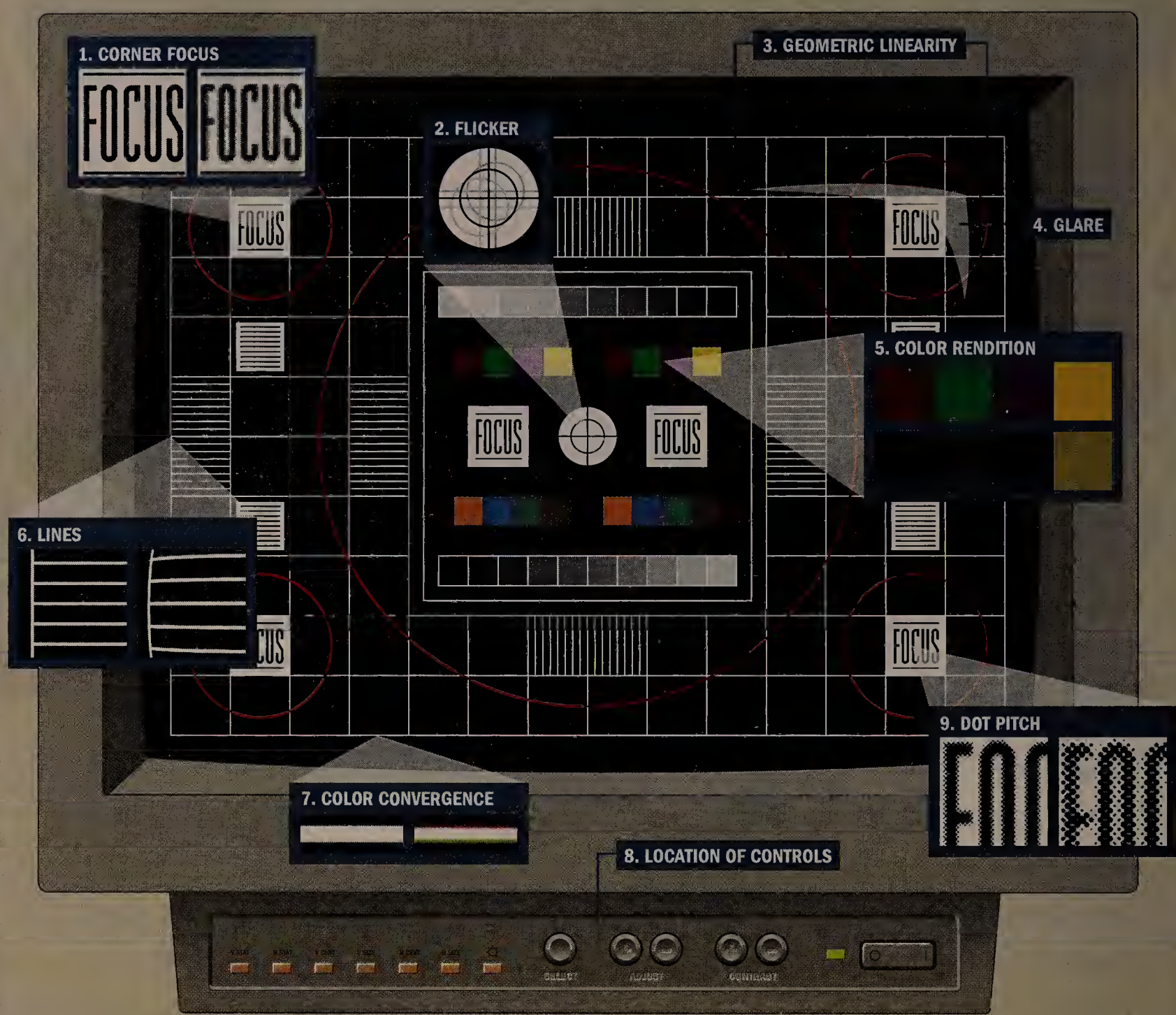


How to Pick a Monitor



1. CORNER FOCUS: Sharp focus shouldn't be restricted to the center of the screen. Place the same word or image at the center and in all four corners, and compare its appearance in the different places.

2. FLICKER: Look for any visible screen flicker, preferably using your peripheral vision. A steady, thin image on a white background will show flicker best.

3. GEOMETRIC LINEARITY: You want the squares within the grid to remain the same size across the screen.

4. GLARE: Look for a monitor with as little glare as possible. Curved screens show more glare than flat ones, and all 14-inch monitors are curved.

5. COLOR RENDITION: Each color in a color bar or selection chart should be close to but distinct from those next to it. If not, adjust the contrast and brightness controls; if that doesn't work, don't buy the monitor.

6. LINES: Lines on screen should be straight and parallel, without curving like a pincushion or a barrel.

7. COLOR CONVERGENCE: Follow a white line from one side of the screen to the other. It shouldn't break up into different colors.

8. LOCATION OF CONTROLS: You want as many of the controls as possible up front, where you can adjust them easily while looking at the system.

9. DOT PITCH: A wide dot pitch, such as .39mm, results in fuzzy letters and a lack of detail at resolutions greater than 640 by 480. Images are sharper at .28mm.

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you SCSI hard, tape, and CD ROM drives that all work together off the same adapter. For tips on configuring multiple SCSI devices, see "So That's Why They Call It SCSI" in the September *Hardware* column.

Whichever drive you opt for, you'll want it to be as fast as possible. Don't be misled by advertising claims of a low random-access time (the amount of time it takes a drive's head to move from one sector to another). Tests done at the PC World Test Center show that a drive's average access time has little correlation to its performance in the real world. Even the drive's listed data-transfer rate tells you relatively little.

Luckily, two less-publicized statistics can help you judge a hard drive's performance: platter rotation speed and on-board cache or buffer size. *Rotation speed* is, quite simply, the rate at which the disks spin, and you shouldn't be satisfied with anything less than 3600 rpm; 4500 rpm is even better. On-board drive cache sizes for most IDE hard drives range from 64K to 256K, and bigger on-board disk caches seem to be better. Also, look for drives that have look-ahead or prefetch caching, which reads the next sector on the assumption that you will probably need it. Also look for write-back caching, which holds off writing to the disk until a convenient time. For more details, see "Buyers' Guide: 200MB Hard Disks" in the April issue.

Only three things are certain in life: Death, taxes, and desire for a faster processor. At some point, you're going to want to upgrade your CPU, without buying a new computer.

Floppy Disks

If you're going to install software or exchange data via floppies (and what computer user won't have to do that?), you need a floppy drive—preferably two of them. Why two? Because there are plenty of 5¼-inch and 3½-inch floppy disks out there, and Murphy's Law states that if you have only one size, something that you want very much inevitably will turn up in the other. Besides, floppy drives aren't really that expensive—usually under $60 each.

If you're reluctant to give up two externally accessible drive bays (see "The Case" on the next page for more information), you might want to consider a combo drive that puts both drives in one bay. But that convenience isn't free: A combo drive can cost $150 or more, and many stores don't stock them. And if one of the two drives breaks down, you'll have to replace the whole unit.

If you're determined that you're going to get by with only one floppy drive, make it a 3½ inch. The 3½-inch disks hold more data and are easier to carry. What's more, the 5¼-inch standard is slowly disappearing. In a year or two, you may not need a 5¼-inch drive at all.

There aren't really a whole lot of quality issues to check for with floppy drives; if a company isn't able to make the drives by now, it shouldn't be trying. Nevertheless, there are a few signs that indicate you're in the presence of a turkey. If you can't feel the floppy disk click into place when you slide it into the drive, the drive is wanting. And while your 3½-inch drive shouldn't shoot disks across the room, it should be able to eject them far enough for you to remove them easily.

THE VIDEO GAME

Unless you work exclusively with non-Windows text-based programs, don't settle for standard VGA. You'll need more than 640 by 480 resolution to take advantage of Windows and other graphical environments. Don't let a dealer trick you into believing a system has super-VGA graphics simply because it supports 256 colors; standard VGA supports 256 colors—in 400 by 200 resolution. And if you don't want video to slow your system down, don't settle for unaccelerated super-VGA either. What you want is a graphics accelerator board, preferably one that uses a local bus slot, driving a noninterlaced monitor.

Monitors

Since most of your time is spent staring at the monitor, this isn't a place to cut corners. Tiny letters and flickering images produce headaches and eye fatigue.

First, you need a good-size, multiscan, noninterlaced color monitor with a fast refresh rate. Multiscan monitors support more than one screen resolution, which is absolutely necessary if you're going beyond VGA. One thing to look for in a multiscan monitor is what happens when you move to a text screen in Windows. In a lesser monitor, this act changes the size and position of the image on your screen; a better monitor corrects itself.

The bigger the monitor, the larger the text and graphics on it. When the graphics card changes the resolution in Windows, the objects on screen get smaller, letting you see more of them at a time. So if you use a very high resolution with a 14-inch monitor, your text and icons will become very small. A bigger monitor allows you to use a higher resolution without straining your eyes.

That doesn't mean a 14-inch monitor is out of the question. It will let you use 800 by 600 resolution comfortably, but not much more. A 15-inch monitor offers noticeable improvement and makes 1024 by 768 resolution tolerable—if you have good eyes. Moreover, screens of 15 inches and larger are flatter, reducing glare and widening the viewing angle. If you work a lot with designs or complex worksheets, you might want something larger, like a 17-inch model. But be warned: A very large monitor will put a dent in more than the top of your computer—the cost of monitors rises very quickly with size. A 17-inch unit can easily cost you three times what you'd pay for a 14-incher.

Check the monitor's dot pitch before buying. *Dot pitch*—the distance between two dots of the same color—determines the picture's clarity; the smaller the pitch, the crisper the image. A dot pitch of .28mm or .31mm is acceptable for all work on 14-inch screens and larger.

You'll also want a fast *refresh rate*—the number of times per second (Hz) that the screen is repainted. Studies show most people need a minimum of 70 Hz for comfortable computing; any less, and screen flicker can become annoying. Since refresh rate varies with resolution, slowing down as the monitor paints a more complex picture, be sure to buy a monitor that runs at 70 Hz

GET A VIRTUAL
VIRTUALLY I

Virtual screen technology is like having two monitors in one. Create the mother of all spreadsheets. Run PageMaker and Excel side-by-side. Use your monitor as a viewfinde and pan across to the place you want to be. All it takes to upgrade to a 2048 x 1024 virtual screen is just 2MB of optional RAM (1MB VRAM, 1MB DRAM).

Our chameleon cursor can change size and color so it never gets lost. So you never have to play that frustrating game of hide-and-seek.

†*Performance measured by running WinBench 3.11 at 1024 x 768, 256 colors, using #9GXE Display Driver 9. Dell system configured with 66MHz 486DX2 processor, 16MB RAM and 256KB cache. VL-Bus is a tra names of others.* *©1993 Dell Computer Corporation. All rights reserved.*

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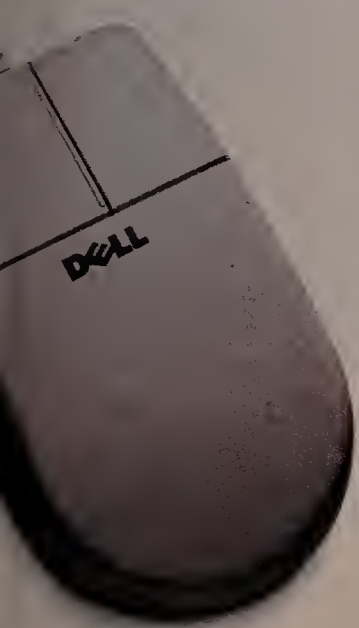
ORIGINAL SIZE



you want to plug in a mouse, Dell gives you a dedicated mouse port.

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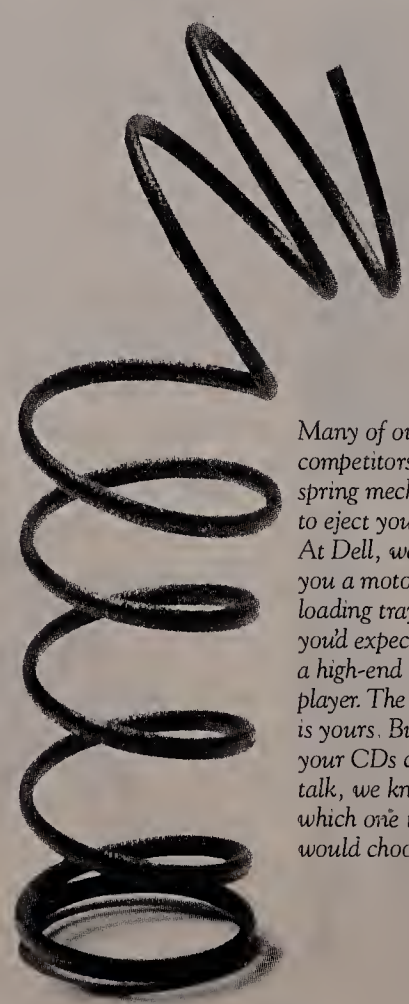

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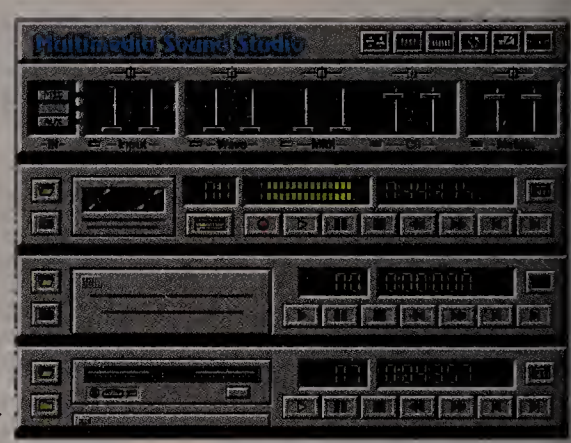

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*All comparisons based on manufacturers' specifications. The Dell CD ROM is the Panasonic 563. Other CD ROMs compared are LMSI CM205 and Sony CDU-31A. Dell disclaims proprietary interest in the marks and names o

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with the resolution you'll be using most. If a monitor has trouble at high resolutions, it will *interlace,* which means only half the image—either the odd-numbered lines or the even ones—is on screen at any time. Interlacing adds to flicker and is best avoided.

Finally, nothing beats looking at the monitor itself. Make sure the image is crisp and undistorted all over the screen, and note where the controls are. Optimally, every switch and knob on the gadget should be easily accessible while you're sitting in front of it; nothing's more frustrating than trying to center a screen image when the tiny centering knob is at the back and the image is on the front. See "How to Pick a Monitor" for more information.

For help choosing a monitor, check out DisplayMate, a $149 program whose finely detailed patterns help you catch focus problems. DisplayMate can also draw your attention to the image sizing and shifting problems mentioned earlier. You'll find a demo version on PC World Online as DM_DEMO.ZIP; this version fits on a single floppy so you can take it to the store. To buy the real thing, or to purchase DisplayMate Professional ($249), which supports super-VGA resolution, contact Sonera Technologies, 800/932-6323, 908/747-6886.

Reader service no. 600

Graphics Board

You'll need a graphics board to run your monitor unless your motherboard has an integrated graphics controller. When you run Windows on 486 power, you don't want to wait for the picture to catch up, so use a Windows accelerator. An accelerator lightens the CPU's load by processing video data itself. This is especially true if you have a local bus accelerator, because it can process data faster still. Virtually all graphics accelerators handle multiple resolutions and can send noninterlaced images to a monitor that's able to handle them.

A video accelerator needs its own RAM, enough for your chosen resolution. Simply put, you can't increase the number of pixels on the screen or the colors each pixel displays unless your card has enough memory to hold the image. You'll want at least 512K of RAM on the board, which will let you display 256 colors at 800 by 600 resolution, or 16 colors at 1024 by 768. A board that can hold more memory will allow you to upgrade later.

PHYSICAL FITS

Once you've got a motherboard, drives, and a video card, you need somewhere to put them. And you need something to power them.

That's where the case and power supply come in. These two inexpensive but important items are intrinsically tied, since the kind of case that you buy determines the kind of power supply.

The Case

Basically, you want a case that can hold all the drives and expansion cards you may need to put into it but will fit neatly into your work space. A number of standard models are available, so you'll likely find something to suit your needs.

An important consideration is the number of drive bays a case has, particularly externally accessible bays, which can hold removable media such as floppy disks and CD ROM.

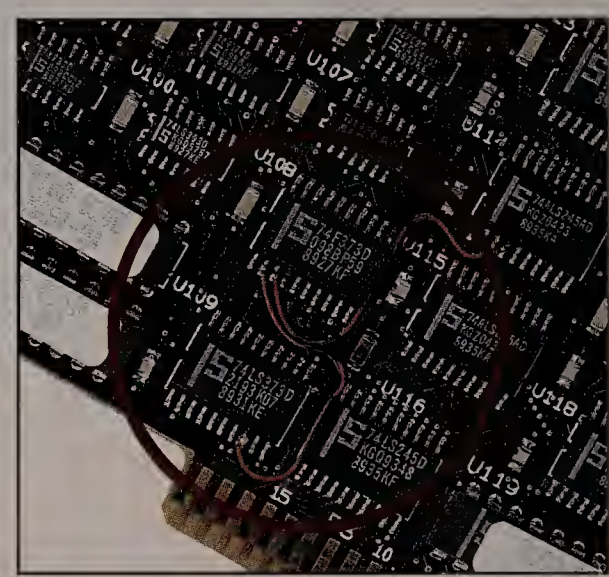
Many cases come with only three externally accessible bays, which may not be enough.

If you want two floppy drives, a CD ROM drive, and a tape backup drive, three front-loading bays just won't do. There are work-arounds: You can use a combo floppy drive that handles 5¼- and 3½-inch disks, or you can buy an external CD ROM drive, but getting a case with plenty of bays in the first place is a simpler solution. One modern trend is to make all bays externally accessible, which gives you more options but can be misleading when you look at the case: What looks like an extra bay may actually contain the hard disk. Note that you don't need four 5¼-inch bays (sometimes called *half-height* bays because 5¼-inch drives used to be twice as high as they are now); some tape drives and all 3½-inch floppy drives can go into the smaller, 3½-inch bays that are popping up in a number of cases.

Cases come in all shapes and sizes: Some are designed to lie horizontally on your desk, some to sit vertically on your desk and some to stand vertically on the floor. Larger cases generally allow for more slots and drive bays (the actual number of expansion slots in your computer is the number in your motherboard *or* the number in your case—whichever is smaller), but there are exceptions. As a general rule, vertical cases, called *towers,* have more drive bays than horizontal cases, called *desktops.* Consider your expansion needs and work space, and choose a case accordingly.

Note where the power switch is. Some cases have it on the back panel. Why? Maybe someone did usability tests with gorillas. Front-panel power switches are best, although switches on the side—as on a traditional AT-style case—are usable.

Get a case that can keep its cool. As mentioned earlier, an overheated PC is a disaster waiting to happen, and today's more powerful CPUs put out a lot of heat. Look for a case with good airflow across the CPU and plenty of ventilation holes. Remember that the cooling fan is in the power supply.



TRACER WIRES These wires mean that a board is either badly designed or defective. Don't buy it.

Power Supply

When you choose a case, keep the power supply in mind. Not all power supplies fit all cases, and if you ever need to replace the power supply, you'll want options from more than one vendor. If your original power supply is designed for a standard AT, baby AT, or minitower case, you should have no trouble replacing it.

Of course, you'd rather not have to replace the power supply, and if you start with one that can handle your needs, you probably won't need to. Most systems come with 220- or 230- watt power supplies, fine for most users. But if someone tries to sell you a 170-watt box, move on; anything less than 200 watts is asking for trouble.

Many mid- and full-size towers come with 300-watt boxes, a good size for file

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servers, which generally make big power demands. But an individual user shouldn't need more than 220 watts. A good heavy-duty, state-of-the-art power supply costs only about $65, so you needn't skimp.

QUALITY IN/QUALITY OUT

The tools you use to control your computer—the keyboard and the mouse—have gotten a lot of attention lately. People have come to realize that these devices affect their physical comfort—and that's very important.

Keyboard

The first question is whether you're content with the standard 101-key layout. It's the kind most computers come with and the one most people are familiar with, but there are plenty of alternatives—keyboards with function keys on the left, keyboards with unusual cursor keys, and keyboards you can reprogram to match your own needs and habits. There are even odd-shaped, ergonomically oriented keyboards designed for the health of your arms and hands. Look around and see if anything appeals to you.

If you decide to stick with a standard 101, there's no reason to pay a lot of money or settle for something that doesn't feel right. No-name 101-key keyboards sell for about $45 to $50 a pop, are usually well made, and are available with just about every kind of touch imaginable. Whether you like a strong snap or a soft whisper when you press a key, there's an inexpensive 101-key keyboard out there for you. Shop around. By the way, recent ergonomic research suggests the soft touch is, in the long run, easier on the fingers than the hard click.

Bottom line? Keyboards are a dime a dozen; don't get stuck with one you don't like.

Mouse

Windows, OS/2, and even most new DOS applications are designed to be pointed at as well as typed in. That means you need a mouse or an alternative pointing device like a trackball. As with keyboards, buy something you're comfortable with. Experiment. For more information on keyboards, mice, and other input devices, see "Finding the Perfect Touch" in our September issue.

I/O

To talk to your printer, mouse, and other peripherals, your computer needs ports—at least one parallel and two serial. The ports may be on your motherboard. If not, you'll need a separate I/O card, typically 8 bit. You can save slots by buying one card that has the three ports, a floppy controller for two drives, and an IDE hard drive connector.

THE COMPLETE MACHINE

A motherboard, hard and floppy disk drives, a monitor and graphics card, a case and power supply, input devices, and ports. Put them all together and what do you get?

If you answered "a great PC," you're only half right. Make sure the pieces are all compatible, put them together properly, test them, add software and technical support, and *then* you'll have a great PC.

TJ Byers is a contributing editor and Lincoln Spector an associate editor for PC World. *They can be reached on PC World Online (see page 10 for more information).* ■

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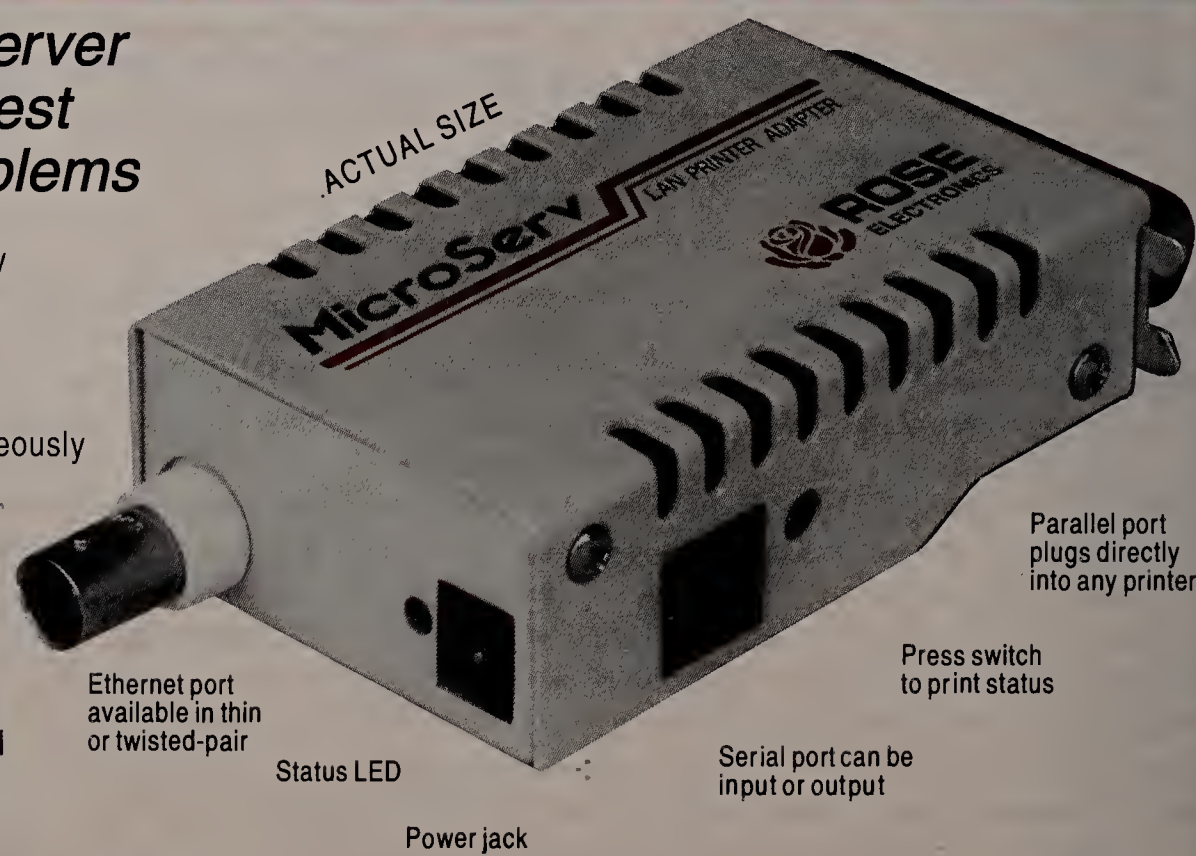

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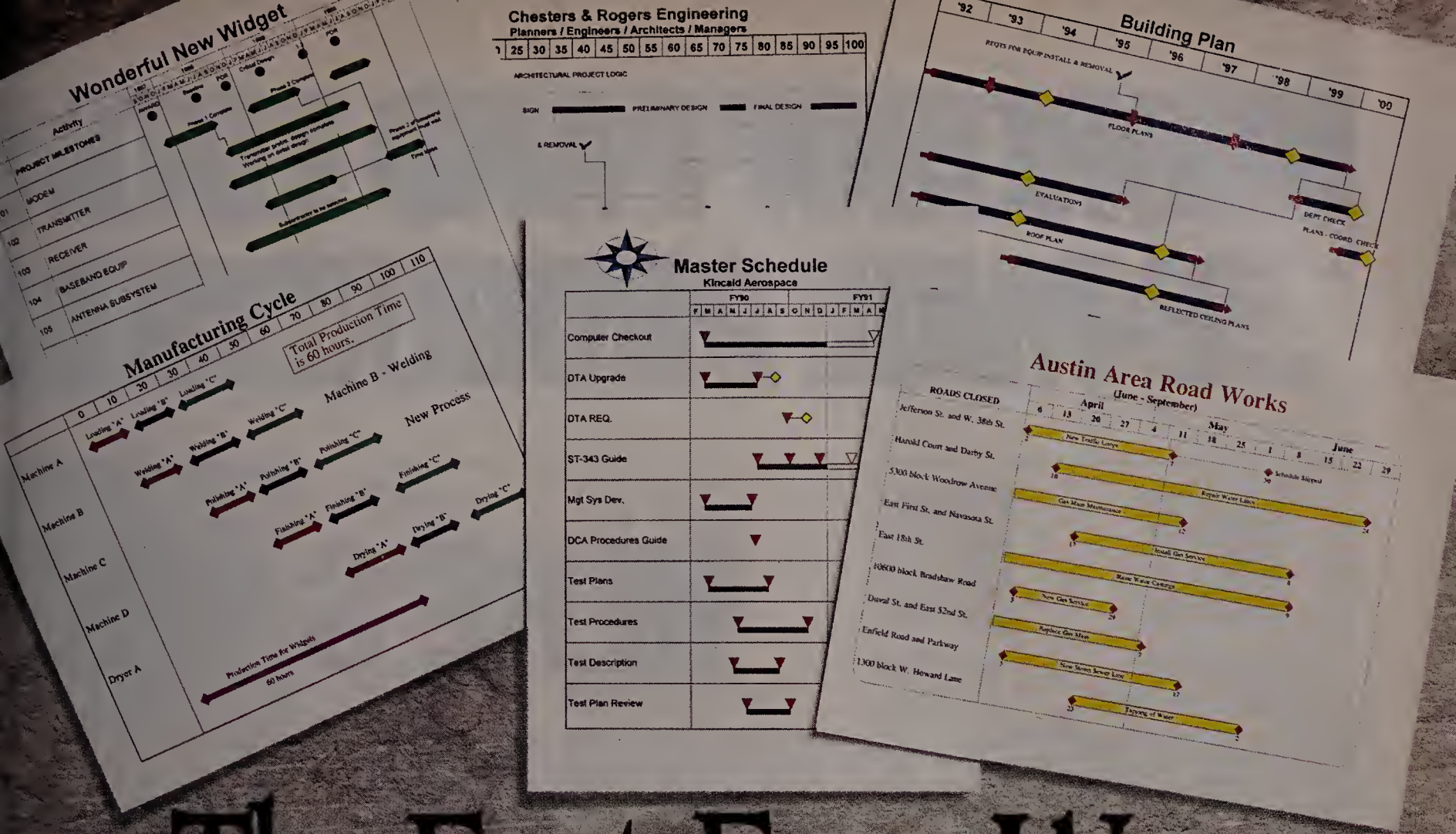

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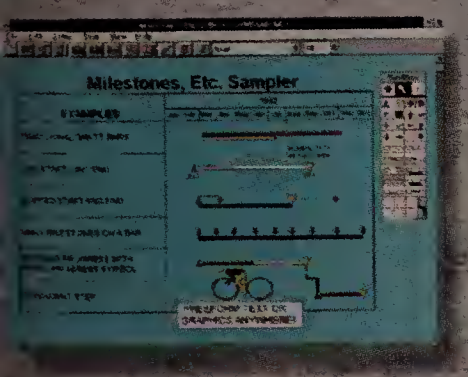

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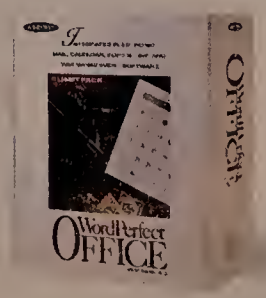


12
SHOWDOWN

Showdown on the Desktop

NT Challenges OS/2 2.1

Tired of DOS–with or without Windows? Considering an upgrade to Windows NT or OS/2 2.1? We ran two users through a series of real-life tests to see how the two operating systems stack up.

The wait is over. You can now purchase one of the hot new 32-bit operating systems—Windows NT 3.1 or OS/2 2.1—and slap it on your machine. But should you? If the answer is yes, you're left with a second burning question: Which one?

We were asking these questions ourselves at *PC World*, so we put Windows NT and OS/2 through some real-life trials, with actual users performing standard business tasks. Our plan was to evaluate the two contenders not as network servers or super–high-end workstations, but as desktop operating systems for power users who take their computing seriously.

Our guinea pigs for this project were *PC World* contributing editors Scott Spanbauer and Brett Glass. The ground rules were simple: We asked Spanbauer and Glass to pick either NT or OS/2 2.1 and, stopwatch in hand, perform a series of everyday tasks. The next day, in a scenario reminiscent of the Bill Murray movie *Groundhog Day*, each tester performed the same tasks again—but this time using the other operating system.

By Brett Glass, Scott Spanbauer, and Steve Fox

Both Glass and Spanbauer were using Gateway 2000 66-MHz 486DX2 machines with 16MB of RAM; they chose their own business productivity applications.

The tests, run during the last week of August 1993, are snapshots of the state of the software. Though Windows NT began shipping in early August, there are no full-blown 32-bit software applications yet available for it. Microsoft and others are predicting a torrent of NT-specific programs by the end of this year and throughout 1994. These new applications should be very fast and reliable, and they should benefit from NT's multitasking and multithreading capabilities. But for now, both testers were limited to 16-bit Windows and DOS software when running NT.

OS/2, on the other hand, has been available for a while and has a passel of compatible software. Glass took advantage of 1-2-3 for OS/2, which he found to be responsive and aesthetically pleasing. He also played with the older 32-bit CorelDraw 2.5 for OS/2 and SofNet's FaxWorks OS/2 with OCR 1.38. Despite the inducements of existing 32-bit software, Spanbauer played it safe, sticking with the standard Windows and DOS applications he uses in his everyday work: Excel, Word for Windows, PageMaker, WinFax Pro, and a number of communications packages.

What We Learned

While NT and OS/2 may be excellent candidates for a network server—with NT's built-in networking and robust security giving it an edge—neither operating system is likely to take the individual desktop by storm. For starters, they're slow. Both testers reported that OS/2 2.1 ran Windows and DOS applications a bit slower than Windows or DOS itself, while NT was slower still—about 10 to 20 percent slower than Windows or DOS alone. This lag isn't crippling, but why take a performance hit when you upgrade?

The much-ballyhooed stability of these operating systems is certainly in evidence.

The Spanbauer Experience

Heavy Work Load

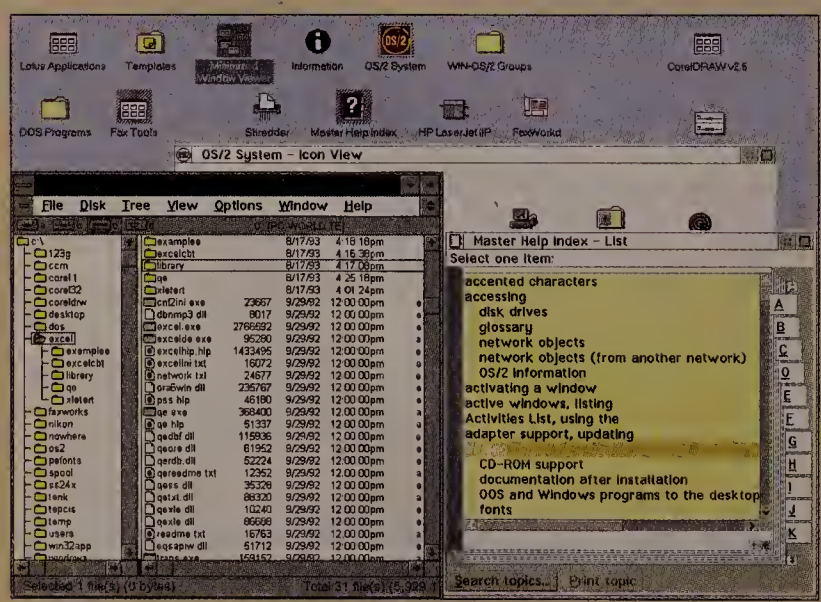
Scott Spanbauer doesn't have time to get his morning tasks done. He's creating an annual report for his largest and most lucrative client, TymeSynch, and the company needs to see a proof by tomorrow morning. Complicating the issue, Spanbauer has a 2 p.m. meeting with another client, so he'll have to finish the report this morning.

For the annual report, he'll do some editing: "Nothing big, just checking for glaring errors and polishing the report's bland, big-business tone to a dull gray." While editing, he'll also check his three E-mail accounts: MCI Mail, which he polls using The Wire, a Windows front end from SWFTE; The WELL, "the indispensable BBS where the counterculture electronic elite meet," which he accesses using a DOS program called Sweeper; and TymeSynch's own E-mail system, which he browses using the DOS-based cc:Mail Remote.

The annual report should include some stock figures, which he'll download from CompuServe, paste into an Excel worksheet, clean up, and fax to his TymeSynch contact. TymeSynch also wants to include the latest annual sales figures, which his contact will fax to him in the morning—Spanbauer hopes in time for him to use them.

Once he's satisfied with the text of the report, Spanbauer will pour it into a PageMaker 5.0 template, paste in the stock data and the faxed sales figures, format the copy, make a few cosmetic repairs, and then print the completed report. Last, he'll switch to Word for Windows and print a document for his afternoon meeting.

As if this project isn't ambitious enough, we are throwing in one more task to make sure his day is a challenging one. During some unbridled housekeeping, Spanbauer inadvertently deleted two large patch files—bug fixes—for WinFax Pro. He'll try to download these files in the background while balancing the demands of his other projects. Here's how Spanbauer fares under OS/2 2.1.



ACCESS TO TOOLS FROM THE OLD INTERFACE—such as the File Manager—makes the transition from Windows to OS/2 easier.

Day One: OS/2 2.1 Under Spanbauer

9:00 I begin working on the TymeSynch annual report text in Microsoft Word for Windows. OS/2 gives me two choices when running DOS and Windows applications: I can launch the Win-OS/2 Program Manager (nearly identical to Windows 3.1's Program Manager), then launch applications from it as I would under Windows. Alternatively, I can launch applications from the OS/2 desktop: OS/2 created a folder for each Program Manager group in Win-OS/2 during installation. I opt for the latter.

I'm much more accustomed to Windows than OS/2, so I spend my first half hour getting used to the way OS/2 works. Pressing <Alt>-<Tab> or <Alt>-<Esc>, for example, switches between running applications, but it doesn't pop up minimized applications à la Windows. Also, these keystrokes bring up only the top OS/2 application. To get to other OS/2 folders or icons, I have to minimize everything in the way or pop up the Win-

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Both Glass and Spanbauer were able to crash individual applications while other applications kept chugging along. And both operating systems do a great job of multitasking background communications. But, says Spanbauer, "so does Windows 3.1." "Not so," counters Glass, "since Windows has a nasty tendency to crash when multitasking DOS and Windows applications."

Communications in general proved iffy. Spanbauer was unable to make either operating system run multiple communications applications using the same serial port. He was also frustrated by an inability to send or receive faxes from NT or OS/2. Once fax programs are released for NT, this problem should clear up. Glass had no trouble faxing with OS/2, but he gave up on NT in this department.

As far as the interface goes, the users were split. Spanbauer, a regular Windows 3.1 user, notes that OS/2's user interface is "clearly intelligent, almost shouting 'Look at me, I'm object oriented!'" He adds, "It's an operating system built by computer scientists, to be used by computer scientists, and its desktop quickly becomes cluttered with open folders that turn navigation into an elaborate game of hide-and-seek."

Spanbauer is partial to NT, with its comfortable Windows look, familiar conventions, and straightforward icon and window management. But will Spanbauer make the switch? "I see no compelling need," he says, "at least not until some killer applications come along that will make me more productive, such as an NT-specific front end to multiple online services."

Glass, a hard-liner who prefers DOS to Windows because he believes graphical user interfaces are generally a waste of time, found himself swayed by OS/2's charms. "The interface took some getting used to," he notes, "but I think it's worth the effort. Right now I'm working on projects that involve DOS memory management, but as soon as I'm done with that, I'll put OS/2 on my primary machine."—*Steve Fox*

Operating Systems Seen Through Glass

Interruptions Interrupted by Interruptions

Brett Glass's days are typically filled with faxes, phone calls, E-mail, and other interruptions. In whatever time is left, he accomplishes his main tasks. So for his two-day trial, Glass developed a scenario to test whether a 32-bit operating system would help him juggle his time effectively between a primary project and a string of distractions.

The main task will be to create and desktop publish a menu for the 2nd Street Cafe and Coffeehouse (a cafe in Laramie, Wyoming, that Glass frequents). This is not a fictional project: The proprietors want the new menu ASAP and are uninterested in which operating system Glass uses. They are interested in seeing a proof of the menu by 1 p.m. and if it meets with their approval, getting it duplicated before dinnertime. Cafe co-owner Lisa Scrak will be coming by midmorning with food prices, ideas for artwork, and a rough draft of the copy that will go on the menu. She and Glass will choose typefaces, enter the item descriptions and prices, and throw in some clip art to make the menu more appealing.

Throughout the morning, Glass will be receiving calls and faxes from several other clients. To keep track of all this client contact, Glass will use the DOS outliner ThinkTank, which he coauthored. Throughout the experiment, he'll periodically check for E-mail on CompuServe, which he accesses using the popular TAPCIS program, and on a client's private cc:Mail system, which he polls using cc:Mail Remote.

Day One: NT Under Glass

9:00 My computer system powers up with a dual-boot menu that allows me to enter the old familiar MS-DOS system or the new 32-bit Windows NT. I choose NT and wait a minute while the disk chugs and grinds. I press <Ctrl>-<Alt>-<Delete> to log on to NT, which greets me with a small dialog box requesting my user name and password. (NT, unlike DOS and OS/2, always attempts to validate users—though bypassing this security is easy if you have physical access to the machine.) NT pops up with a Program Manager that's the spitting image of Windows 3.1's. Alas, it has most of the same disadvantages: The interface shows icons that represent programs rather than files. I notice one novelty, though: The little arrow cursor, which is otherwise similar to the one in Windows, is wagging its tail. I discover that NT offers a wide selection of animated cursors. They look like fun, but they won't help me get work done any faster.

I will need CorelDraw 3.0 to create the menu, so I install it from CD ROM. I place the CorelDraw 3.0a CD ROM into the drive and then use the File•Run command to start Corel's setup program. The installation takes less than 15 minutes, and I'm pleased to notice that Corel has generously added more than 100 TrueType fonts to my current collection—all of them accessible throughout NT.

9:20 I start CorelDraw, open a new file, and set up guidelines to divide the paper for a trifold menu. While I work, I start cc:Mail

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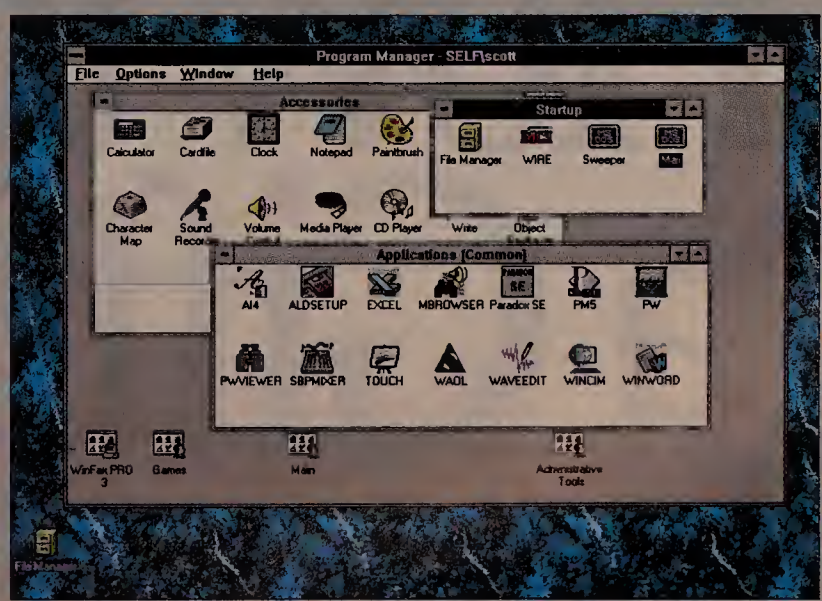

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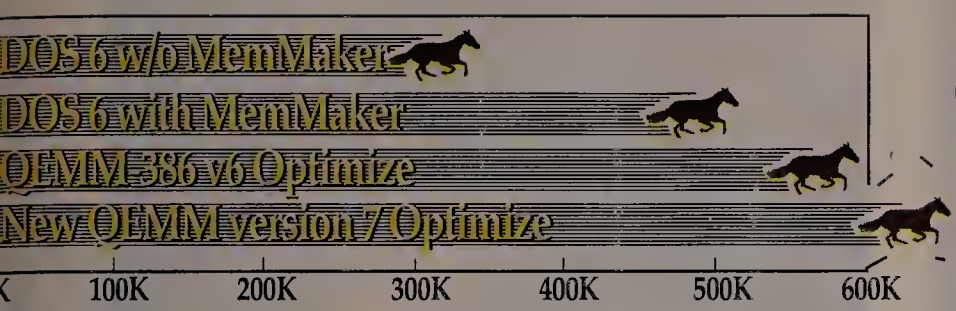

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DOS 6 Giveth; DOS 6 Taketh Away

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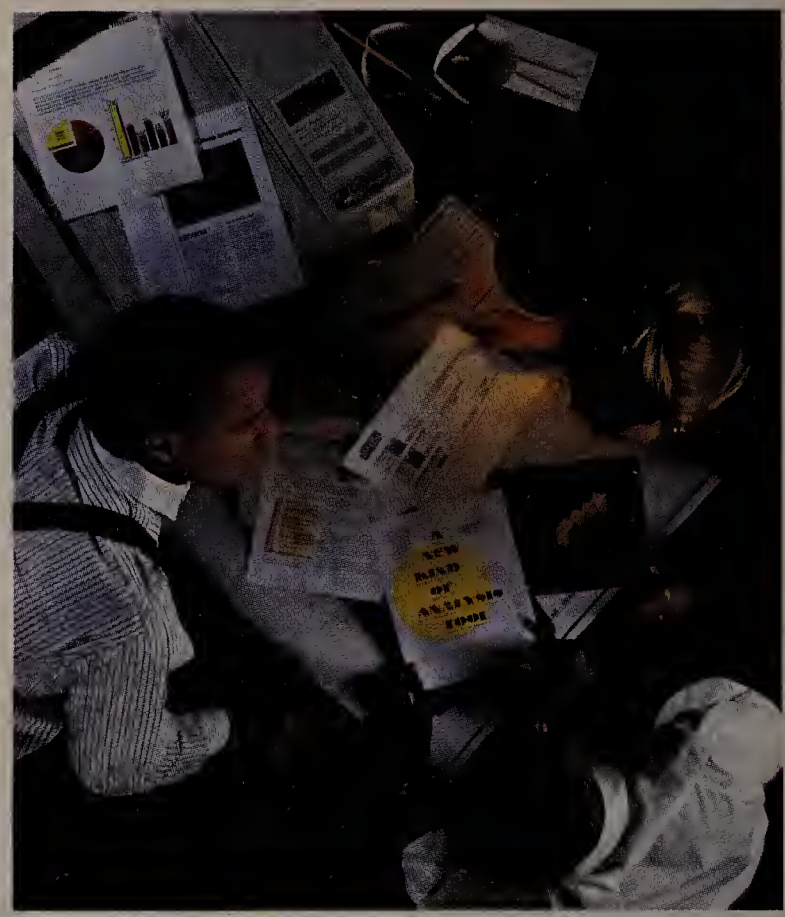

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OS/2 Under Spanbauer continued from page 234

dows List—the OS/2 equivalent of Windows' Task Manager—which still doesn't let me get to programs or folders that aren't open. I'm also irritated by the way OS/2 handles my DOS and Windows icons: By default, minimized programs don't show up on the desktop, but in a minimized icon viewer instead.

9:30 Scrolling through the Word for Windows document using the cursor keys is slightly slower under OS/2 than under DOS. I open Sweeper and check The WELL—no problem initiating a session and then minimizing the application while it downloads messages. Later, when I try using cc:Mail Remote, OS/2 won't give it access to the COM port. Apparently OS/2 has assigned control of the port to Sweeper, which is still open (though not online). This limitation really burns me because I don't want to open and close a communications program every time I use it. I run into another problem: From the Win-OS/2 Program Manager, The Wire can't find the modem. It works fine, however, if I launch it from an OS/2 folder. There's probably a solution to this in the settings for the Win-OS/2 session, but I don't have time now to find it.

10:00 It's time to pull the stock price history off CompuServe. PM Terminal can't find the modem until I close The Wire and cc:Mail Remote, which are minimized on the desktop. There may be a way to get around this limitation, but time's a-wastin', and I can't find it in the online help. I close the programs and try again; this time PM Terminal dials CompuServe without a hitch. I go to the online stock quotes section, enter some ticker symbols, and I've got my quotes. I copy the figures, paste the data into Excel, switch back to PM Terminal and hang up, then switch back to Excel and parse the data. Getting several rows and figures to parse properly can take some trial and error. After about 10 minutes of wrangling with the figures, I finally get it right.

10:30 I try to fax my new stock table from within Excel, but an OS/2 error dialog box informs me that another application is already using the COM port. I opt to retry the operation—OS/2 will pause the operation long enough to let me switch to and close whatever program is in the way. When I choose this path, however, <Alt>-<Tab> and <Ctrl>-<Esc> have no effect; I can't switch to the desktop or the minimized icon viewer to see what's using the COM port. Naturally, the same dialog box pops back up to inform me that there's still a conflict. The fault may lie with WinFax Pro, but why is OS/2 letting a badly behaved application bog down the user interface?

Instead of retrying the operation, I cancel it, and OS/2 closes WinFax Pro and Excel. I check the desktop and the minimized Windows Viewer. There's clearly no other communications program running; the problem must be with WinFax Pro itself. I've noticed a Win-OS/2 setting that lets multimodule programs such as WinFax Pro open the COM port with one program module and use it

NT Under Glass continued from page 235

Remote (a DOS program) in the background to pick up my E-mail. At first it won't connect to the main post office, but after I add the parameter Comm/Lock (which helps solve problems with serial port timing and modems that switch speeds) to the command line, it connects. cc:Mail Remote retrieves a message containing a client's Excel spreadsheet with the results from a recent research study. (As I later find out, cc:Mail Remote is the only communications software that I'll get to work under NT.)

9:40 Another client calls, asking if he can fax me a document for review. (I've contacted a number of clients beforehand and asked them to call me with their requests at preset times today and tomorrow.) Realizing that I haven't yet installed any fax software on the NT machine, I tell my client to fax me in an hour. I then reach for Delrina's WinFax Pro software. Unfortunately, the software fails to install; it's just not able to find or communicate with the fax-modem. After 30 minutes of diddling (punctuated by more telephone calls), I give up and—thinking that the problem might be with WinFax—attempt to install SofNet's FaxWorks Pro for Windows. This program, which has worked well for me under Windows, also fails to install under NT. Realizing that NT is not Windows-compatible enough to handle a Windows fax program, I abandon all attempts to send and receive faxes on the NT machine. Instead I'll use my DOS workstation, which contains an Intel SatisFaxtion card.

10:18 I receive a call from Siobhan, the client who sent me the Excel spreadsheet via E-mail. She asks if I've looked at the numbers yet and tells me the time and date of a conference call in which we'll discuss them. For the first time since I've trans-

Windows NT

Pros

- Provides better multitasking and protection from poorly written applications than DOS or Windows.
- Runs most DOS and Windows applications, as well as OS/2 1.*x* character-mode and POSIX applications.
- User interface nearly identical to Windows 3.1—Windows users won't need to learn to navigate the new OS.
- OS incorporates networking software.
- Password-secured log-in and multiple user accounts.

Cons

- Doesn't run DOS or Windows applications that access system hardware directly, such as fax, scanner, and hard disk utilities.
- Doesn't allow multiple communications applications to remain in memory and share a serial port sequentially.
- DOS and Windows applications run noticeably slower than under DOS.
- Requires two to three times the RAM OS/2 needs.
- Log-in procedure excessively cumbersome.

OS/2 Under Spanbauer

from another. This setting doesn't help. WinFax Pro displays a 'Cannot send data to hardware' message, and the Win-OS/2 system freezes. I decide to fax from Windows.

11:00 I switch to DOS using the straightforward dual-boot option: I simply double-click an icon, and a command line interface confirms the operation. Once in Windows, I fax the stock-comparison information to my client with a note asking her to look it over and call before sending the return fax. This way I have a chance to switch to DOS again.

I receive faxes 24 hours a day, so if I continue to use OS/2, I'm going to need one of the fax programs written for it. Switching back to OS/2 takes about 2 minutes.

11:15 I'm way behind schedule: I have a critical 2 p.m. appointment with another client, and I'm starting to get worried about finishing this project on time. Importing the text and Excel table into PageMaker goes smoothly. There's no word on the TymeSynch LAN about my contact's progress with the fax. I decide to check for messages on The WELL, and get the same COM port contention as before. This time I'm able to switch to cc:Mail Remote to close it while OS/2 holds The WELL software's dial in abeyance—a nice trick, once you get the hang of it. As soon as I close cc:Mail Remote, The WELL call goes through in the background without trouble. Again, there must be a setting that allows multiple communications programs to stay in memory at one time, but I can't find it.

12:00 My contact calls and is ready to fax the stock comparisons to me, along with some additional sales figures. I

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NT Under Glass

ferred it to the NT machine, I open ThinkTank—my personal information manager—and try to add the appointment to my to-do outline. ThinkTank normally responds with a bright little click every time I press a key. But under NT, something's badly wrong. My keystrokes produce persistent noises ranging from flatulent bass notes to annoying, high-pitched beeps and squeals, and keystrokes take a long time to register. After suffering through this cacophony for several lines of text, I remember an undocumented key sequence, <Ctrl>-<Alt>-<F1>, that turns off ThinkTank's sound. With the sound off, the program works but is still sluggish; even on the fast Gateway 486-66, there's a noticeable delay between the time I press a key and the time a character appears on screen. After recording the appointment, I pull up Microsoft Excel and look at the worksheet that came in the mail. Excel works fine, which is not surprising; it's unlikely Microsoft would ship NT if it had trouble running Microsoft applications. Nonetheless, it seems that Windows products—even those from Microsoft—run somewhat slower under Windows NT than under Windows itself.

10:35 The fax arrives and so does Lisa, eager to work on the menu. While we're discussing the details of food pricing and menu design, I start TAPCIS and let it poll CompuServe. TAPCIS works correctly in a window, but when I press <Alt>-<Esc> to run it full screen (so I can watch what it's doing), the DOS session freezes up. Pressing <Alt>-<Esc> again does not help; the text window now shows a large black hole where part of the TAPCIS display should be. Realizing that I'm still connected to CompuServe and running up online charges, I press <Ctrl>-<Alt>-<Delete> to bring up the Task Manager and kill the TAPCIS task. I have no time to explore solutions for this problem, so I resign myself to squinting at TAPCIS in the DOS window.

10:50 I now turn my attention back to Lisa. She wants to include some clip art in the menu, so I start CorelPhoto-Paint (a licensed version of ZSoft's popular PhotoFinish program) to edit the bit-mapped image. But unlike CorelDraw, which seems to be running fine under NT, CorelPhoto-Paint crashes immediately after start-up. Despite the crash, the rest of the system keeps running. So I switch to the less powerful Paintbrush to view and edit the image.

11:15 We enter the text of the menu, typeset the entries, and import more clip art from the Corel CD ROM. During this process, I receive a few phone calls and enter information into ThinkTank, which is still unusually slow. We stay focused on typesetting and composition for about 1 hour. No unexpected problems with NT.

12:15 We're ready to print our first sample of the menu. Printing to my HP LaserJet II works perfectly under NT after I learn the difference between NT and Windows printing: In NT, combinations of printers and ports can be selected by name. The first draft

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OS/2 2.1

Pros

- Provides better multitasking and protection from poorly written applications than DOS or Windows.
- Runs nearly any DOS or Windows application.
- Includes OS/2-compatible version of Windows 3.1 Program Manager as an alternative to the Workplace Shell.
- Saves the state of your desktop at shutdown, then reloads apps and their data files when you boot up.
- Object-oriented interface offers more Mac-like ease of use than Windows or Windows NT.
- Brett likes it.

Cons

- Workplace Shell user interface takes some getting used to—for example, shortcut keys don't pop up all running applications.
- DOS and Windows applications run noticeably slower than under DOS; some may require setting system configuration to run properly.
- Doesn't prompt you to save data in running Windows applications before shutdown.
- Doesn't allow multiple communications applications to remain in memory and share a serial port sequentially.
- Doesn't include networking software.

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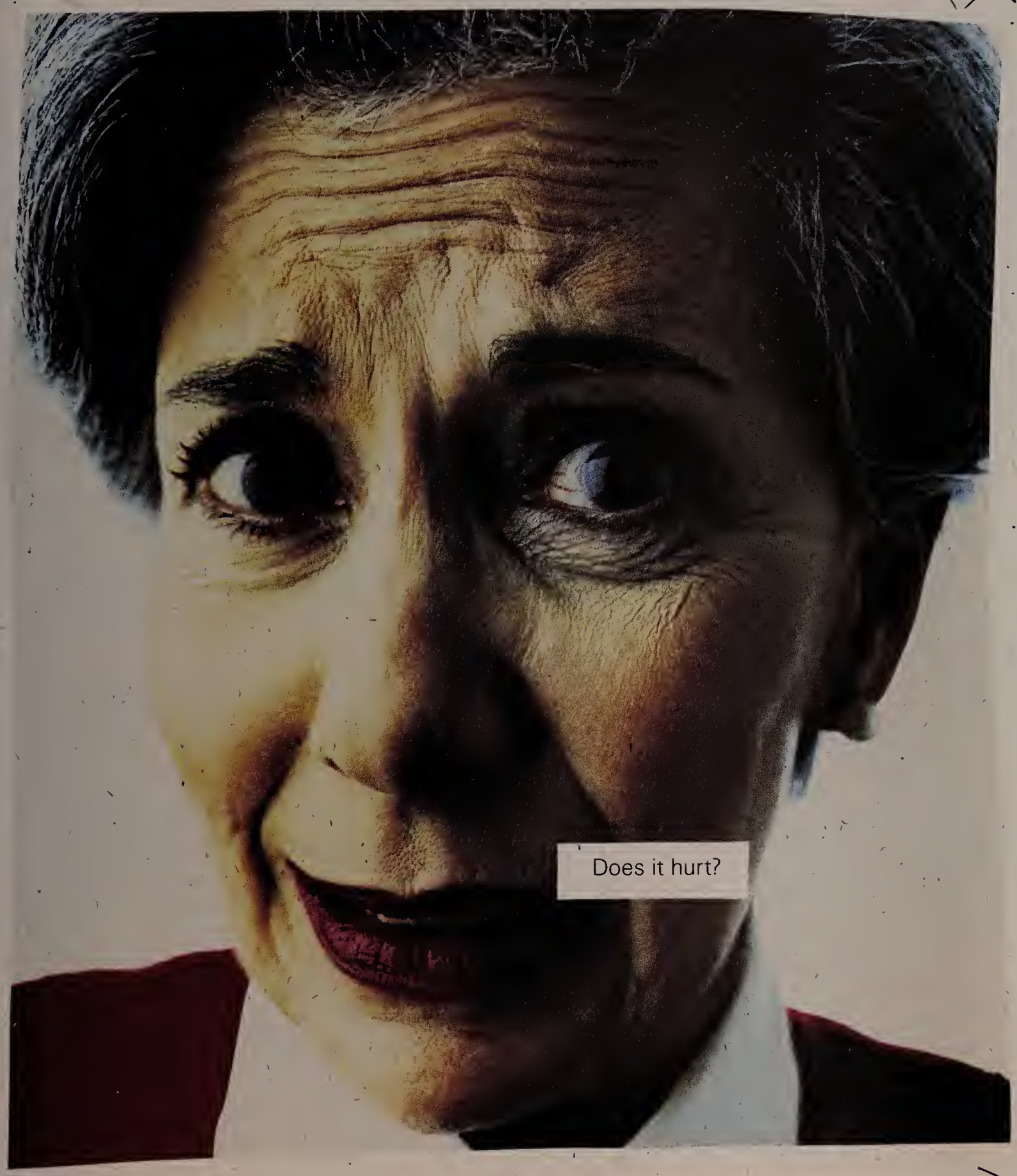
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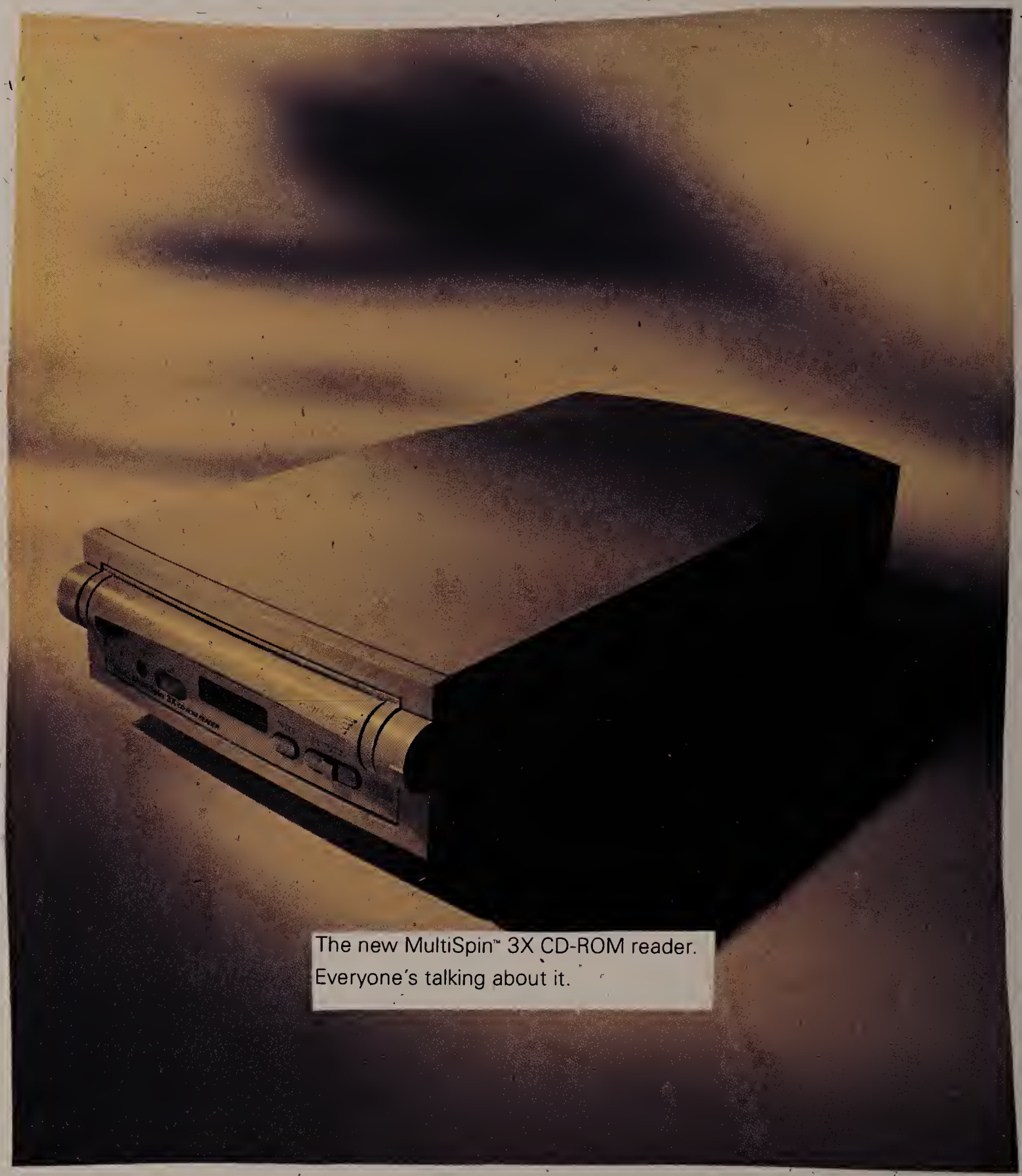
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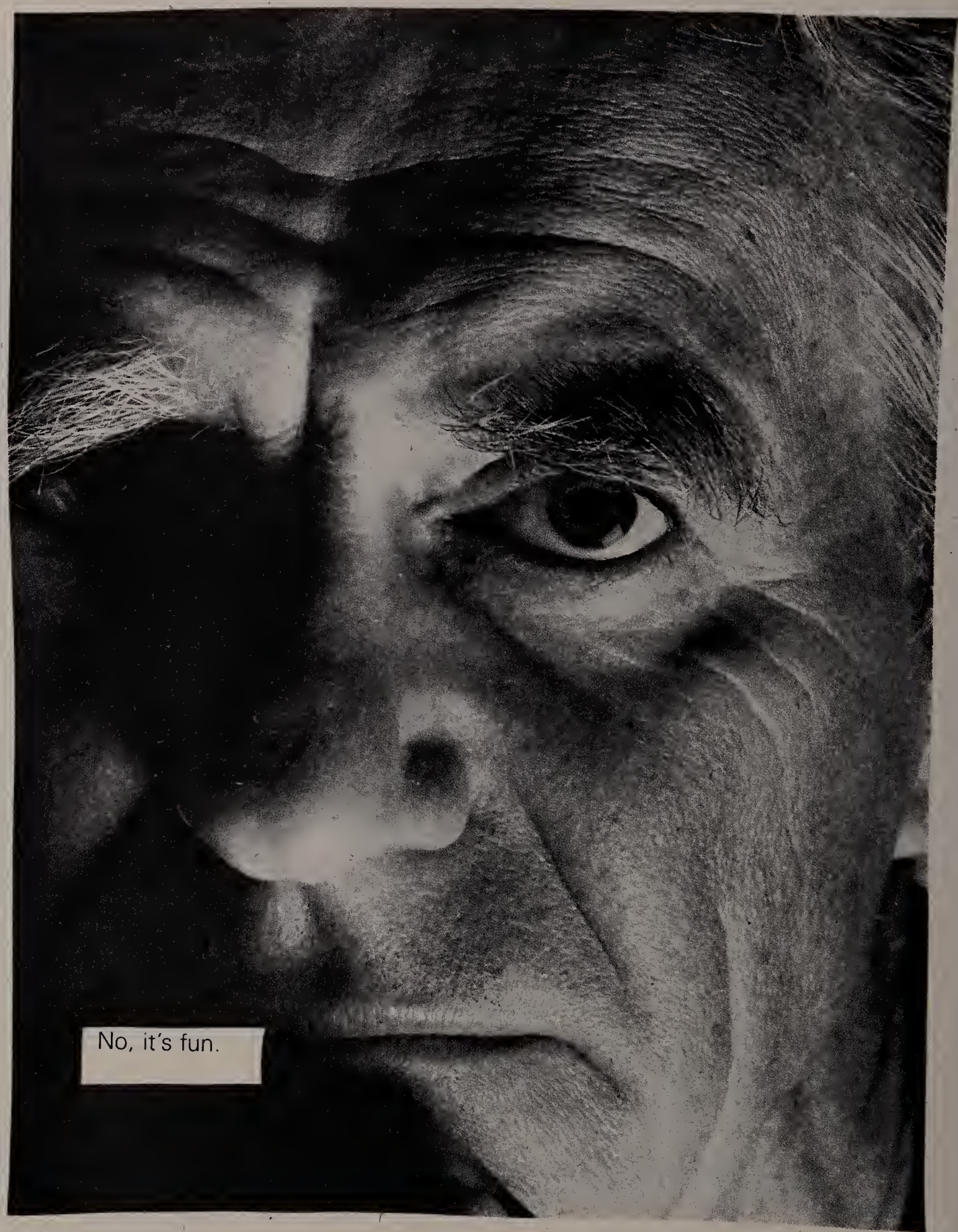
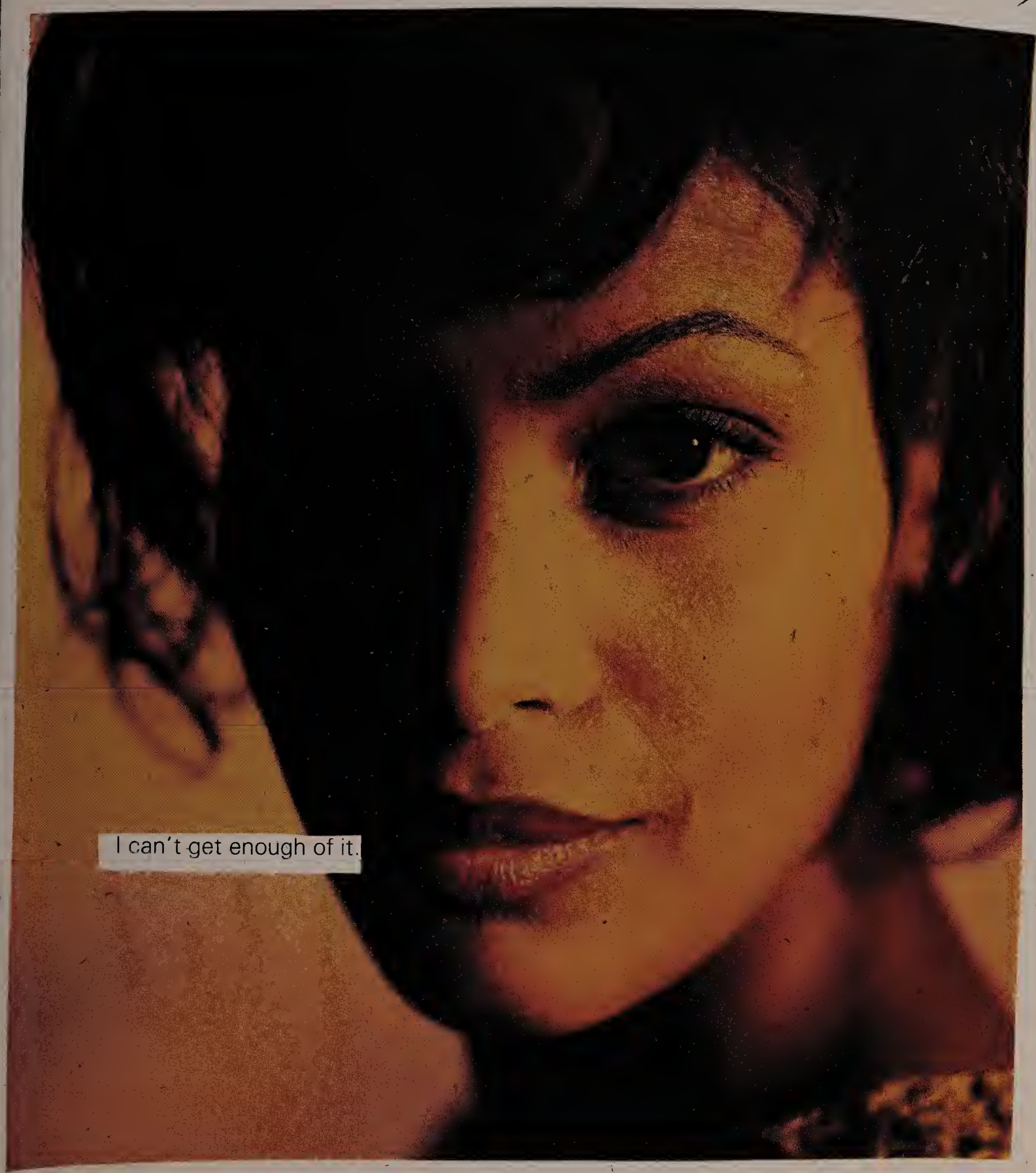

No, it's fun.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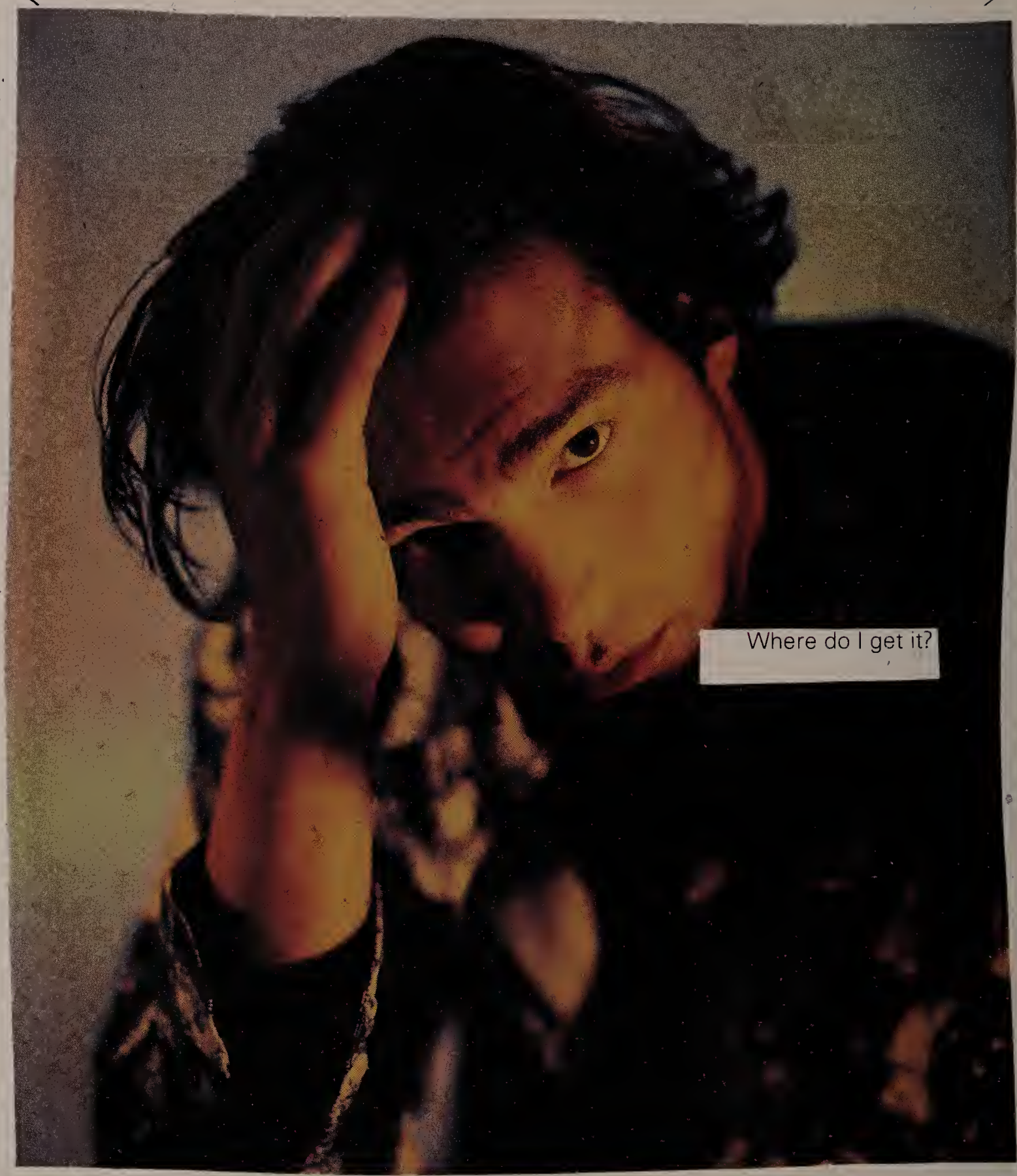

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OS/2 Under Spanbauer continued from page 240

switch to DOS and Windows 3.1 and put WinFax Pro at the ready. The fax comes in without trouble, and I switch back to OS/2 to use the program's OCR software. When I get back to OS/2 and run WinFax Pro, the fax is there, but I'm unable to view or convert it. The viewer window opens up, but without the usual controls and without displaying the fax. Back to DOS. I'm really running short on time now.

WinFax Pro quickly recognizes the fax under Windows, but I may have to spend some time cleaning it up under OS/2 before pasting it into my report. I reboot to OS/2 and get under way. One of the great things about OS/2's Dual Boot feature is that when you switch back to OS/2, all the programs are exactly as you left them.

12:30 I start downloading those WinFax Pro patch files. PM Terminal makes downloading easy, and I receive the files in no time. Oddly, I can't minimize or move PM Terminal, which is sitting on top of OS/2's key desktop icons. I launch Word for Windows and open the file containing the fax. It's garbage, and I'll have to retype it by hand. This isn't OS/2's fault. But since I can't view faxes under OS/2 using WinFax Pro, I abort the download, switch back to DOS and Windows, run WinFax Pro's viewer module, and retype the sales figures.

1:10 I switch back to OS/2 and launch PageMaker, only to find that my stock price table is gone! I failed to save the changes before flipping to DOS to receive the fax, and OS/2 didn't prompt me before closing down. Caveat publisher! I reinsert the stock table as well as the sales figures, issue the print command, then try to switch away from PageMaker as it goes through its ponderous printing routine. OS/2 takes its time, but eventually it lets me switch to WinWord and print a second document—notes for my 2 p.m. appointment—without difficulty. I finally return to PM Terminal and begin downloading the WinFax Pro patch files. I leave the computer chugging along as I head out the door for my afternoon meeting.

Elapsed time: 4.5 hours

Day Two: NT Under Spanbauer

9:00 Rewinding the clock, I start again the next day, this time under Windows NT. I'm a Windows user, and NT behaves exactly like Windows 3.1, so I don't have to waste time getting acquainted. I launch Word for Windows and open the annual report text. The scroll speed is about the same as under OS/2 and slightly slower than with DOS/Windows. Next I launch my suite of communications programs—The Wire, Sweeper, and cc:Mail Remote. For me, switching among applications is much simpler under Windows NT than under OS/2. Just as with Windows 3.1, pressing <Alt>-<Tab> invokes the cool-switch box, which shows you in turn the name and icon of every program running. Releasing <Alt> brings up the selected program, whether it was minimized or maximized.

I dial into TymeSynch's LAN, then switch away to keep working on the Word document—cc:Mail Remote chugs along in the background without a hiccup. When cc:Mail is done, I try dialing into The WELL using Sweeper. Windows

NT Under Glass continued from page 240

is close, but we tinker with the menu a bit more and at last settle on a final version. Even though CorelDraw redraws the screen more slowly under NT than under Windows, we've managed to get all the information formatted and typeset in record time.

12:30 We're finished. Lisa takes the output and heads for the local copy shop, while I grab an apple and return telephone calls.

Elapsed time: 3.5 hours

Day Two: OS/2 2.1 Under Glass

9:00 I've installed OS/2 directly onto the same system that was running NT, and it has *migrated* my Windows applications; in theory, all the programs I was running under NT are available under OS/2. In order to compare CD ROM installation procedures on Windows NT and OS/2 2.1, however, I've deleted CorelDraw after the first day's work. There's no password protection on the OS/2 machine, so it boots right up into the Workplace Shell. Unlike Windows and NT, the Workplace Shell lets you put icons right on the desktop. And because it's

> I launch Word for Windows under NT. The scroll speed is about the same as under OS/2 and slightly slower than with DOS/Windows.

easy to click the document you want, rather than the app, it's easier to start working on a specific file. The interface does take a little getting used to if you're a Windows user, but I've worked in OS/2 before, and I'm comfortable with it.

I'm now ready to set up the page, pick the fonts, and draw guidelines for the menu, which means I'll first have to install CorelDraw 3.0 for Windows. I insert the CD ROM, click the Drives icon, select the CD ROM drive, and double-click CorelDraw's setup program. The CorelDraw CD ROM sets everything up almost exactly as it did under NT and native Windows, except that some of the new files—such as the fonts—go into special subdirectories that OS/2 creates for Win-OS/2 applications. (Unfortunately, as I discovered later while working with native OS/2 applications, Corel's wonderful fonts are accessible only to other Windows apps—not to OS/2 apps.)

The installation takes about the same amount of time it took under Windows NT, and when I bring up CorelDraw, it looks just as it did before—except that the icons of the Workplace Shell desktop and the wallpaper peek around the edges. I notice that CorelDraw takes a bit longer to start up under OS/2. (I was told later that this is due to a safety feature: OS/2 is creating a completely protected virtual machine and is booting copies of DOS and Windows within it to run Corel.) Before I start laying out the menu, I start cc:Mail Remote running in the background. As before, I

NT Under Spanbauer

with my client via cc:Mail Remote (the only communications program running, naturally). There's no message yet—not surprising, since it's been only a few minutes since I sent the fax. I open my PageMaker template and import the text of the annual report—currently a Word for Windows document.

10:25 The client calls and is ready to fax back the stock comparisons, plus a page of additional sales data. I ask her to wait a few minutes while I shut down NT and reboot to DOS. WinFax Pro works like magic; too bad Delrina has no immediate plans for a Windows NT version, because I'll probably buy the first competing program written for NT.

10:40 Just as I had done under OS/2, I switch back to Windows NT, which boots up in about 1½ minutes. Unlike OS/2, however, NT doesn't resume where I had left off. Before committing optical character recognition (OCR) on the unsuspecting fax, I start downloading those important WinFax Pro patch files. (True, I downloaded the files yesterday under OS/2, but for the sake of fairness, I deleted them before starting today's exercise.) Terminal gives me no guff, and soon the kilobytes are sailing into my system. Minimizing Terminal, I move on to the OCR task. I open WinFax Pro, which gives me a number of brusque error messages. The program seems to run anyway, and I'm able to view the fax and run the OCR software on it in just a few seconds. When I close WinFax Pro, I see none of the error messages I received under OS/2.

I relaunch Word for Windows and try opening the fax, now supposedly recognized and converted to text. As expected, the text is pretty much unintelligible. In this case, however, I don't have to reboot to DOS and Windows to read the fax. Though NT won't allow me to send faxes, I can open WinFax's viewer module, tile it and Excel side by side on the desktop, and retype the fax's contents into a worksheet. There's not much data, so it takes only about 5 minutes.

11:15 With the file patches continuing to download in the background, I open the annual report again in PageMaker. I import the stock price comparison and sales figure tables, and spend about 25 minutes cleaning up the design.

11:50 Time to print and run. From PageMaker I invoke the print command. Switching away from PageMaker during printing *seems* more responsive under Windows NT than under OS/2: The cool-switch box pops right up and lets me choose a program to switch to, then disappears when I let go of the keys. Nothing else happens until PageMaker is good and ready, however. The program-switching seizure seems to take just as long as OS/2's—about 15 seconds. After a minute or two, NT's Print Manager still hasn't sent the pages to the printer. Opening NT's Print Manager application shows that the document had in fact been printed to the spooler, but for some reason the printer is paused. When I try it a second time, it works right away. With the annual report squared away, it's time to print the WinWord document, which includes notes for my 2 p.m. client meeting. I check my watch and realize it's only noon. Maybe today I'll have time to grab lunch.

Elapsed time: 3 hours

OS/2 Under Glass

can't read Excel files, however, so I open Excel on the OS/2 desktop long enough to read the file and write it out again in 1-2-3 format. Excel is a little quicker to start than CorelDraw was, perhaps because the system has already fetched the information it needs to do Windows emulation. I could stay in Excel, but I go back to the native 1-2-3 for OS/2, which is more responsive.

10:35 It's finally time to work on the restaurant menu. I already have the source material from yesterday's adventures, so Lisa doesn't have to stop by today, saving me a few minutes. I've already run TAPCIS and dealt with the fax and my E-mail, so I forge ahead faster than I had done in the NT scenario. CorelPhoto-Paint runs beautifully under OS/2, so I'm able to use its enhanced features to smooth, rotate, and shade the image quickly. The superior software takes about 15 minutes less than Paintbrush.

10:45 I'm running well ahead of schedule, so I decide to check out the 32-bit version of Corel—CorelDraw 2.5 for OS/2—to do the typesetting for the menu. Installation from a CD ROM is very easy and takes less than 10 minutes. Even so, it proves to be time poorly spent. This incarnation of CorelDraw was designed for an earlier version of OS/2, and while its 32-bit code makes it fast, it's now one-and-a-half generations old and not as easy to use as Corel's latest software. For example, it's not WYSIWYG; you must imagine the finished product as you edit wireframe outlines of the objects in your picture. (I hope Corel offers an updated CorelDraw for OS/2 2.1, because it would probably be faster and easier to use than the Windows product.) In any event, I figure that I'll save time by using the WYSIWYG product, so I return to CorelDraw 3.0 and finish the design.

The best solution would be an operating system that doesn't force you to fall back on DOS and Windows.

11:45 Since I've already dealt with my faxes and didn't have to fuss with crashing E-mail programs (there are one or two phone calls for which I make a few more notes in ThinkTank), I'm ready to print my first draft a half hour earlier than yesterday. Printing works as well under OS/2 as under NT. OS/2's printing is a little less flexible (there's no obvious way to redirect output to a file, for instance), but that doesn't influence this particular task. As happened yesterday, I find minor nits to pick in the menu. After one more printout, I call Lisa and ask her to stop by to pick up the menu copy. Now I'm ready for lunch—a well-deserved reward.

Elapsed time: 3 hours

Brett Glass and Scott Spanbauer are contributing editors and Steve Fox is a senior editor for PC World.

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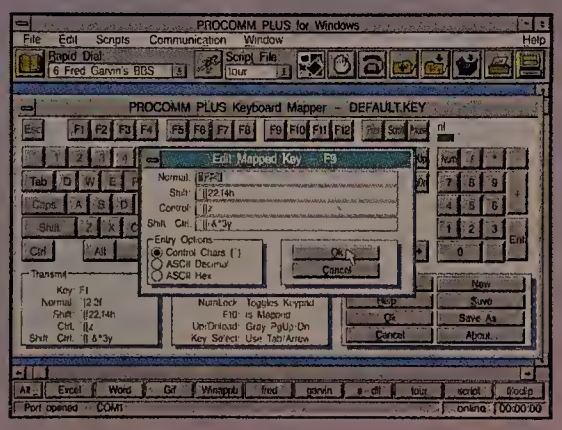

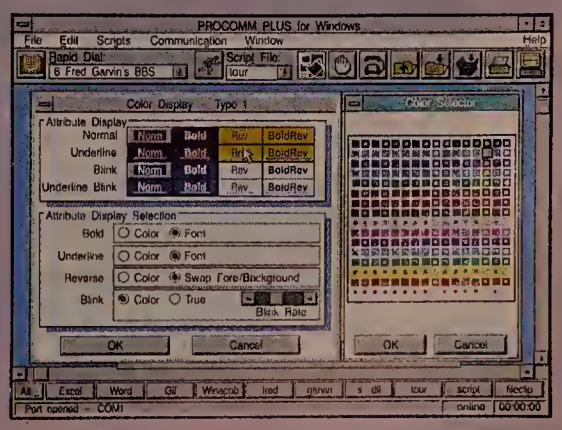

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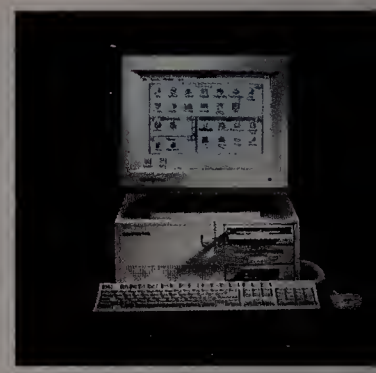

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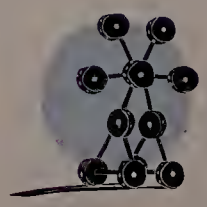

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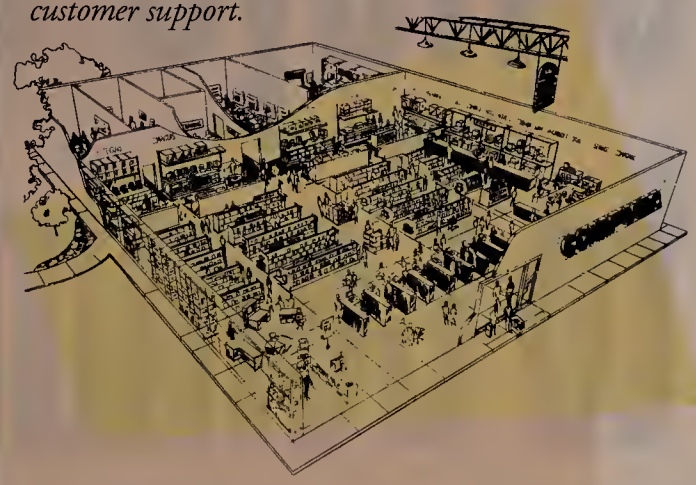

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WINDOWS COMMUNICATIONS

8 Ways to Communicate With Windows

Data communications with Windows was once as full of surprises as shaking hands with a joy buzzer

Data communications programs—known as one of the most user-hostile application categories—have finally come into the Windows fold, with virtually all major vendors now offering Windows versions. Has Windows, with its graphic arsenal of icons and sculpted dialog boxes, been able to tame these contrary beasts?

Well, yes and no.

Configuring modems, understanding how to select a terminal emulation, writing scripts to connect to online services, and other such chores are no easier to accomplish in a Windows-based communications program than they are in their DOS-based predecessors.

Still, many users will find the Windows interfaces, with their icons and familiar drop-down menus, easier to use. Want to start capturing a session in Crosstalk for Windows? You won't have to search through menus for the capture command. Instead, just click the Video Recorder icon in the tool bar at the top of the screen. A little red light on the camera lets you know capture is active.

But if Windows has only marginally improved the ease of use of communications programs, it has made a world of difference in the way those programs can fit into your workday. Just try to get your DOS communications program to dial CompuServe, access the business forum,

These low-cost programs handle the handshakes and relieve the headaches. By Patrick Marshall

download selected stock quotes, and automatically update cells in an Excel spreadsheet. Using the scripting capabilities of the Windows communications programs, in conjunction with Windows' Dynamic Data Exchange (DDE), makes such features possible.

Even if writing complex scripts is beyond your knowledge or your desire, you can still take advantage of Windows' integration capabilities by employing the Clipboard to cut and paste data from an online session into other Windows applications.

And then there's the multitasking. Ever had your boss call with a question about budget figures and you've had to call her back later because your computer is busy downloading files? If you're doing that download under Windows, it's not a problem: Just call up your spreadsheet and the files will continue to download in the background. Doing downloads in the background can take a bit longer than in the foreground, since most communications programs are allotted less CPU time than other applications currently running. But you're able to get other work accomplished during a file transfer, so the extra time it takes isn't nearly as important.

So why did it take so long for the likes of Procomm and Smartcom to get into Windows? Put simply, Windows is a daunting environment for communications programs, and, until recently, users had to take too big a performance hit to do their work in Windows.

For starters, until the introduction of version 3.1, Windows didn't even support the high-speed chip sets used in I/O boards, which deliver rates of 9600 bits per second (bps) and higher. As a result, while you could run a 9600-bps modem under Windows 3.0, it wouldn't transfer data as fast as the same modem running under DOS.

Second, though Windows 3.1 now supports I/O boards equipped with the high-speed UART 16550 chip—which provides buffers, or temporary storage when data is transmitted faster than the modem can receive, allowing higher-speed connections—Windows multitasking puts demands on applications that are CPU intensive, such as communications programs. Since Windows is constantly doling out CPU time to other applications, communications programs have to settle for less-than-complete access to the microprocessor. Some of the Windows communications programs have adapted by allowing users to increase the share of Windows CPU time they receive. Others automatically adjust their share of CPU time depending on whether they're running in the foreground or background.

But that's not the end of Windows' multitasking hurdles. Under certain circumstances, SmartDrive, Windows' caching program, can actually wipe out data during a file transfer. The culprit is SmartDrive's write-delayed option, which temporarily stores changes you've made to files. When SmartDrive finally writes cached data to disk, it disables all the computer's interrupts for about 1 second. If a data transfer is taking place, that means 1 second of lost data.

Curiously, none of the Windows communications programs offers to disable the write cache, though you can do so by altering the SmartDrive command in your AUTOEXEC.BAT file with little if any noticeable loss in Windows performance. The only drawback is that you may occasionally find that the application you're working in will pause while data is written to disk.

Best Buys

Nobody has yet put together the killer communications package for Windows. But for a combination of power and ease of use, you can't beat our two best buys: Crosstalk for Windows and HyperAccess.

Crosstalk offers an unusually clean and easy-to-use interface, good network support, and a strong scripting language and editor. HyperAccess's most notable extras are built-in virus scanning and strong remote control features, including an automatic callback feature. Both programs also offer a broad arsenal of terminal emulations and file transfer protocols.

Picking the Right Package

If you've decided that the pluses of doing your communications chores in Windows outweigh the remaining minuses—and a growing number of users have—you'll still have to figure out which program is best for you. If your communications needs are relatively undemanding, and if you've got a popular, brand-name modem, any of the programs reviewed here will probably suffice. In fact, you may even be able to get by using just the Terminal program that comes with Windows. (See the sidebar "Windows Terminal: Instant Communications.")

All users except those with the most casual data communications needs, however, will want to consider several factors when choosing a communications program.

Modem support. Most Windows communications programs come with more than 100 configuration files, and you can almost count on most popular models being supported. If your modem isn't listed, chances are it will work with one of the generic configuration files, though it may not be fully optimized. But if you've just purchased a brand-new model—especially a high-performance one—you'll want to make certain of support. This is especially important in the case of Hayes' Smartcom, which provides configuration files only for Hayes modems.

File-transfer protocols. At first glance there's little to consider, since all the programs provide all the major transfer protocols—XMODEM, ZMODEM, and YMODEM—and many provide different flavors of those protocols. Though XMODEM is probably the most frequently used protocol, you may want to consider others, depending on the task at hand. ZMODEM, for example, allows you to resume an interrupted file transfer instead of starting again, a godsend if you're sending large files in unreliable conditions. And YMODEM

allows you to queue up a number of files for sending in sequence. Our informal file transfer speed tests indicated roughly equivalent performance between programs except for FutureSoft's two offerings, Terminal Plus and DynaComm, which were noticeably slower. We tested the programs on a 486DX2-66 with 16MB of memory and a Hayes Optima 14.4 fax-modem.

Two of the programs—Crosstalk and HyperAcceess—also offer proprietary transfer protocols. When you use these protocols on both ends, you can generally expeet even faster times with fewer errors.

Scroll-back buffer. Check to see how large a screen buffer the program offers. If you conduct a lot of online sessions or use bulletin boards frequently, you may want to scroll back to see something that has already moved off screen.

Resource handling. Does the program adjust its share of processor time depending on whether it's running in the foreground or background? If not, you're probably going to have your work interrupted frequently when you're transferring files in the background while trying to work in the foreground.

If you use a fax program or an online service's communication program, you'll also want to determine whether the general package you're shopping for relinquishes the serial port when it's not actually in use. Having loaded, say, Procomm Plus, which refuses to relinquish the serial port, you can't use the CompuServe Information Manager to call CompuServe without first closing Procomm.

Call handling. If you call a lot of bulletin boards or other online services—especially if you encounter busy signals frequently—you'll want to make sure the program can queue calls. With call queueing, the program will continue to dial the numbers until it is able to connect with one. That handy feature saves you the tedious task of cycling through the calls manually.

If you place lots of calls, you'll also want to have multiple sessions open at the same time. (A session is a configuration file for placing a call, including name, phone number, modem speed, and the appropriate modem parameters.) Multiple sessions mean you can open a new session without closing a previous one—especially useful if the previous session was busy and you want to retry it. A session that remains open also serves as a reminder to try the call again. Some programs even let you run multiple sessions simultaneously—say, one on a modem and another through a direct connection or network gateway.

Remote access. If you are interested in calling your office computer from home to download or upload files, you will want to check out a communications program's remote-access features. Can you assign passwords so remote users can log on? Can you control remote users' aceess to directories on your hard drive? Can you set the program to call you back to continue the session? That feature can come in handy if it's a toll call, but will be truly useful if you regularly call in from the same phone number, since the callback number has to be preset on the host computer. Finally, some programs also offer nifty chat utilities so users on both ends can carry on a conversation. While any program lets you chat in the terminal window, chat utilities separate your typing and the other person's typing into two windows, making it much easier to follow the conversation.

Network support. If you plan to share a network modem or modems, you need a program with network support. Five of the eight communications programs reviewed here, for example, can be used to access modem pools using NetWare's NASI protocol. And only four of the programs here support NetBIOS networks.

The Importance of Scripting

One feature of data communications programs that is rapidly gaining importance is scripting. Many programs come with a library of predefined scripts for such operations as logging onto online services and setting the program and modem in answer mode to receive calls. If you subscribe to a popular online service such as CompuServe or GEnie, you may find the program provides a ready-made script to simplify things. Generally, you just provide your user name and password the first time you use the script, and from then on the process is automated.

If you plan to write your own scripts, you'll want to make certain the program offers a scripting language you can live with. Learning any of these scripting languages takes considerable time, so many users rely instead on scripts written by others, editing them to suit their needs. You may want to check on how many scripts are available on the company's bulletin boards or CompuServe forums. Also bear in mind that, in general, the more commands, the more powerful the scripting language.

Finally, if you're going to write your own scripts, check to see if the program offers a built-in script editor. It's generally quicker to open script files using a built-in editor. The editor also often includes extras such as lookup tables, which list the available script commands, and step-through debuggers for locating problems in scripts, which makes writing scripts easier.

Also check to see if the program will let you import scripts. If you're using a DOS version of these programs, you may want to move to the Windows version of the same program. Before deciding, however, check if the Windows version can import scripts from the DOS version. If so, that could save you a lot of work.

Most users will want to pay special attention to the two programs we found worthy of *PC World*'s Best Buy award: HyperAccess and Crosstalk. Both programs offer extensive modem support and broad terminal emulations and file transfer protocols, and are easy to use. HyperAceess has the edge in providing extras, such as scanning downloads for viruses and an auto-callback feature for remote callers, while Crosstalk's clean interface and powerful scripting language deserve special mention.

Windows may have only marginally improved the ease of use of communications programs, but it has made a world of difference in the way these programs can fit into your workday.

Bear in mind, however, that even the Best Buy award does not necessarily mean the program is the best selection for all users. DynaComm, for example, did not rate a Best Buy largely because it lacks many of the other programs' case-of-use features and is relatively expensive. But DynaComm's unmatched network support makes it the program of choice for many corporate users.

Whichever Windows communications program you choose, there are a couple ways to tune up for error-free, high-speed file transfers. First, if your modem is capable of operating at 9600 bps or higher, make sure your serial port uses a UART 16550 chip. If it doesn't, you can buy an I/O board that has one for as little as $40.

Secondly, turn off the software flow control for connections at 9600 bps or faster. Xon/Xoff employs characters inserted in transmitted data that instruct the modem to pause when the transmitted data exceeds the capacity of the receiving modem's buffers. Unfortunately, this method doesn't work well with high-speed transfers. Set the program to use RTS/CTS, a hardware-based flow control.

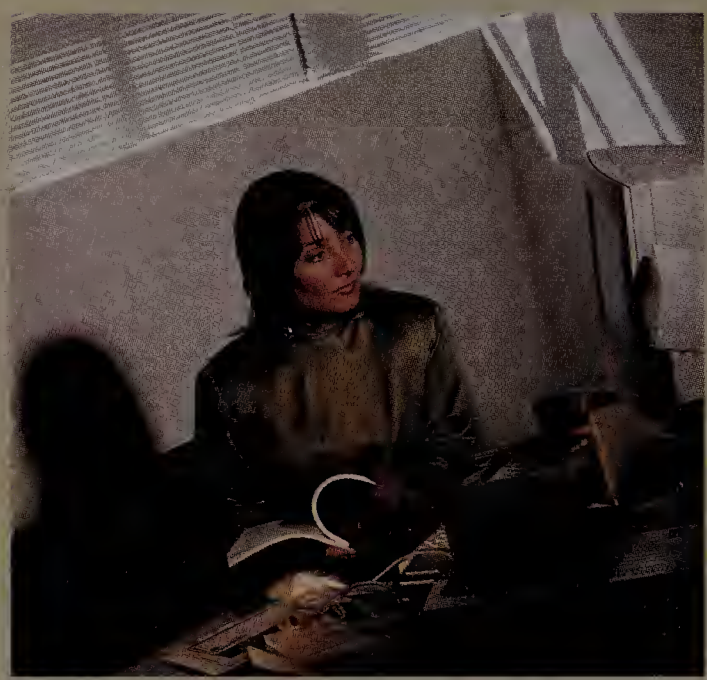
Patrick Marshall is a contributing editor for InfoWorld. *Tom Grubb is a senior performance analyst for the PC World Test Center. Judy Heim is a contributing editor for* PC World.

For more information about all products in this article, circle reader service no. 901.

Are Data Communications Still Difficult? Two PC World Readers Find Out

Whether you want to send budget numbers to the district office, join a CompuServe forum, or send E-mail to an editor at PC World Online, chances are you'll invest in a modem and communications software soon. Now that the DOS generation of classic communications software is available for Windows, and with modems faster and cheaper than ever, we wondered if getting started in data communications has become easier for casual users.

To find out, *PC World* asked two readers to tackle this traditionally user-hostile activity for the first time. Jay Tasho, a controller for a law firm, and Marla Backer, a sales representative for Honeywell, are proficient Windows users, and neither had set up a modem or communications software before. We gave them 2 hours to complete a typical data communications scenario: Install a modem and comm software, then download a file and send a letter to the editor at PC World Online. We encouraged them to think out loud while they worked so we could capture their thoughts.



TRYING TO MAKE SENSE OF IT ALL: PC World *reader Marla Backer attempts to install a data communications program and modem at the PC World Test Center.*

Which Way First?

If you've ever relied on an outdated road map to navigate unfamiliar territory, you understand the uncertainty that nagged both testers. Even choosing which box to open first proved difficult. "I don't know where to look something up to find out what I do first," grumbled Jay. Marla hoped that an 800 number listed in *PC World* would be a good place to start but was disappointed when the high-pitched whine of a modem answered. Both testers were often confused by the many puzzle pieces—modem, communications software, PC, cables, wires, telephone, and online service provider. This is understandable, since the modem manufacturer doesn't know which software the user has chosen or how a given computer is configured for communications. And the software manufacturer doesn't know the specific computer configuration or which modem the user chose. That means the sometimes-hapless user must hazard a few guesses.

Documentation Makes the Difference

Jay frequently referred to documentation to guide him but found it difficult to decide which manual to use. For example, he didn't find the CompuServe guide helpful when he attempted to set up the modem. He reasonably (but wrongly) concluded that the CompuServe account setup material included with the modem was a good place to start since his goal was to connect to CompuServe. Both testers were more successful whenever the documentation used diagrams or screen shots to spell out what to do. Marla avoids documentation whenever possible, but she had to abandon her usual strategy when she realized she'd plugged the phone line into the wrong port on the modem.

Overwhelmed by Choices

One benefit of taking a cab to an unknown destination is that you don't have to follow directions—you assume the cabbie knows where to go. Similarly, both our testers assumed that default settings would guide them through the installation. "I don't know what all those options mean," said Marla. "I'll start with the defaults." While Marla's comm software defaulted to COM1, Jay's did not. "My default selection gave me an 'Error Opening COM2' message. I have no idea what that means," commented a somewhat vexed Jay. He was forced to try different settings until he stumbled upon the right one.

The Bottom Line

The most telling evidence that the process is not navigable for beginners: Even given the 2 hours allotted to the task, PC World Test Center staff had to help Jay and Marla several times. Neither wanted to become a communications expert—they just wanted to finish the job as quickly as possible. Both said that had they been installing the modem and software on their own, they would have enlisted the help of someone fluent in the technology. The message? If you want to start down the Data Communications Superhighway, you may be better off letting an expert help navigate the first leg of the journey. —Tom Grubb

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Datastorm Technologies: Procomm Plus for Windows 1.02

PROS: Strong scripting, utility for building custom interfaces, remote access features, good documentation
CONS: Does not relinquish serial port, no script editor

Procomm Plus for Windows made a big splash when it was introduced last year, due in no small part to the widespread popularity of Datastorm's Procomm Plus for DOS.

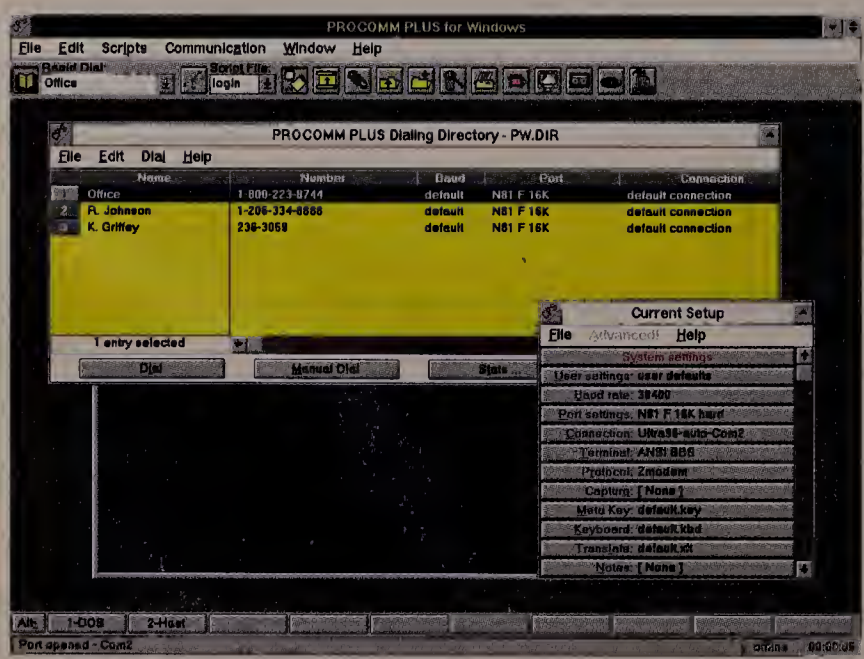
The attention for Procomm for Windows is well deserved. For starters, Procomm Plus, with its beveled buttons, shadow boxes, and eye-grabbing icons, easily offers the most colorful and entertaining interface of any Windows communications program.

And Procomm doesn't rely on looks alone to earn praise. Procomm leads the pack in many feature areas. No other program's scripting language is as extensive as Procomm's 353-command Aspect language. And the program's 34 terminal emulations are the greatest number offered by any Windows program listed here.

Datastorm has also provided a unique Window Builder utility for designing custom interfaces for scripts. The Window Builder lets you pop in icons, buttons, and other graphic elements at will and then move and resize them as you like. Once you've designed and saved the interface, it can be invoked by a script. The result is that you can build custom interfaces with tailored menus to lead users through specific tasks such as calling the bank to download account information or retrieving E-mail from a BBS.

Remote access is another of Procomm's strong suits. Though the program doesn't have a callback feature, it does provide password control, three levels of user log-on security, and the capability to control users' access to host directories. Procomm also logs all calls both in and out.

When it comes to easing new users into the program, Procomm is hard to beat. Installation is simple, and the program offers to convert your Procomm for DOS dialing directories to work with Procomm for Windows. The manuals are clearly written and well organized, and the program's online help is strong. Not only is it context-sensitive and searchable, it offers numerous illustrations and lets you click for more details on many of the elements.



NOBODY BEATS PROCOMM when it comes to a colorful, icon-laced interface. Procomm also offers one of the broadest selections of file-transfer protocols and terminal emulations.

As powerful and flexible as Procomm Plus is, however, there are still a number of kinks to be ironed out. It is irritating, for example, that the program grabs control of its COM port not just when you're making a call, but whenever you load the program. That means you can't run any other programs that also use that COM port.

And though Procomm's scripting language is powerful, the program does not provide a built-in script editor, relying instead on Windows' Notepad. One limitation of that strategy is demonstrated the first time you try to edit the MCI macro: A message says the macro script is too large to open in Notepad. Also, since there's no script editor, you must rely on Procomm's trace feature to debug scripts. That will let you know where there's an error, but it's not as easy to use as a step-through debugger built into an editor.

And Procomm isn't exactly elegant when it comes to operations such as setting up passwords and access levels for remote users. Instead of providing a dialog box for such settings, Procomm forces you to manually edit the host-mode script.

These considerations aside, Procomm is one of the most powerful, flexible, and easy-to-use communications programs under Windows. If you don't need one of the few features it doesn't have, and if you like a colorful Windows interface, you won't go wrong with this latest offering from a veteran data communications company.
Procomm Plus for Windows 1.02, Datastorm Technologies; 314/443-3282, 314/875-0595 (fax). List price: $179. **Reader service no. 632**

Digital Communications Associates: Crosstalk for Windows 2.0.1

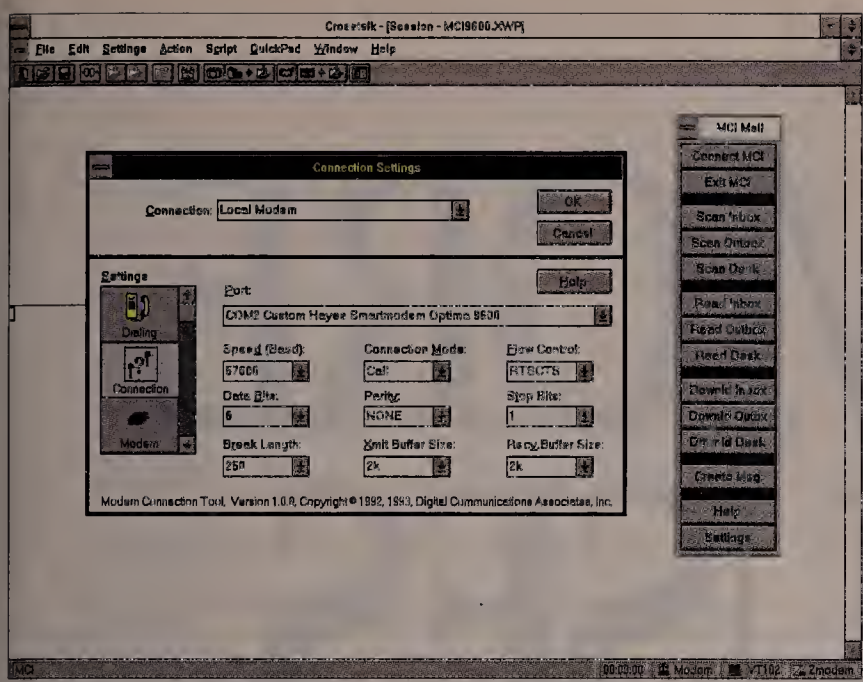
PROS: Easy-to-use interface, strong script language and editor, broad terminal emulations and file-transfer protocols
CONS: None

Crosstalk for Windows is one of the few graybeards in Windows communications programs, having appeared shortly after the release of Windows 3.0.

But longevity is far from Crosstalk's only virtue. With its 18 terminal emulations and 12 file-transfer protocols, Crosstalk is clearly one of the more robust packages. And Crosstalk for Windows is one of only two programs reviewed here that offers its own high-speed proprietary transfer protocol.

Scripting is another of Crosstalk's strong points. The program's scripting language includes 239 commands and is capable of automating virtually any communications task, including conditional actions and DDE operations, to interact with other Windows applications. Where Crosstalk's scripts need some work is in ease of use. The program includes its own script editor and a tracing utility that is helpful in debugging scripts.

Crosstalk is also strong in remote-access capabilities. While there's no callback feature, you can set a password for remote users, keep a log of incoming calls, limit the commands that a guest can use, and restrict them to a specified directory. And unlike some of the competition, Crosstalk doesn't force you into the script editor to change settings. Instead, the host-mode script includes buttons that let you change the switches on the fly.



CROSSTALK'S CLASSY INTERFACE is all business, with its icons and hierarchical menus designed to help you navigate quickly through this Best Buy's robust features.

This most recent maintenance release of Crosstalk—version 2.0.1—in addition to ironing out a few bugs adds call queueing, drag-and-drop file sending, and 256 pages of the scroll-back buffer, increased from 31 pages.

But let's face it. Where Crosstalk recently stood alone in offering its robust set of tools to Windows users, there are now a couple programs that match or slightly surpass Crosstalk's feature set. What now distinguishes Crosstalk most clearly is its interface and its broad user-support base.

If you like a clean, uncluttered Windows interface with some of the best-designed icons anywhere, Crosstalk won't disappoint. The program's tool bar provides access to the commands and utilities used most often, such as opening and saving files, establishing and breaking connections, and turning on screen capture. And Crosstalk's button-pad editor makes creating custom macros for a session very easy.

DCA has taken the same clean approach to documentation. In fact, were the manual's explanations not so clearly written and easy to understand, they would seem too terse. Crosstalk's online help offers similarly concise explanations of program features. Crosstalk does not emulate Procomm's liberal use of illustrations in its online help, but it does provide hypertext links to take users to related topics quickly.

Installing Crosstalk is straightforward, and DCA provides utilities for converting dialing directories not only from DOS versions of the program, but even from Procomm Plus for DOS. Crosstalk for Windows needs 4.5MB of hard disk space, and it requires 430K of system memory to run.

Finally, Crosstalk has a large number of long-time users, as shown by the heavy traffic on DCA's CompuServe forum. That means new users are more likely to find helpful tips and useful new scripts offered by both DCA and other Crosstalk users.

Thanks to its clean and easy-to-use interface backed by its solid set of emulations and transfer protocols, strong scripting capabilities, and remote access tools, Crosstalk easily rates a Best Buy.

Crosstalk for Windows 2.0.1, Digital Communications Associates; 404/442-4930, 404/442-4365 (fax). List price: $195.

Reader service no. 633

Windows Terminal: Instant Communications

Why shell out $150 for an electric screwdriver to remove your computer cover, when your old manual screwdriver will do the trick?

In the same spirit of economy, take a look at Windows' Terminal program before you spend a few hundred dollars on a data communications program, which may be chock-full of features you never need. If your needs are basic, this unassuming little applet may be all you need...and you've already paid for it.

It's true that Terminal doesn't come close to the power and breadth of features found in the Windows communications programs reviewed here. Its top speed of 19,200 bps, for example, means you can't take advantage of a 9600-bps modem using full data compression. Terminal is also marginally outfitted with three modem configuration files (Hayes, Multi Tech, and TrailBlazer), two binary file-transfer protocols (Kermit and XMODEM/CRC), and three terminal emulations (TTY, VT-100, and VT-52), and completely lacks remote access, scripting, multiple session capability, and network redirection. In the same vein, Terminal's interface is sans frills—no button bars with attractive icons, no drop shadows to program messages, no sculpted dialog boxes. As severely limited as this program is, however, you can at least set up and save sessions for making simple, low-speed connections to online services and other computers. —Patrick Marshall

Enable Software: PowerLine 1.1

PROS: Easy to use, broad modem support, low price

CONS: No script debugger, can't load multiple sessions, can't password-protect remote access

PowerLine is the newest member of the Windows communications packages family. And aside from having to call tech support to find out how to properly enter the serial number so we could get on with installing the program (you use just the last 11 digits, and don't put in the hyphens). We found PowerLine one of the easiest to get along with in this curious clan, especially for those who don't need advanced features.

PowerLine provides 428 modem configuration files, so you'll be beating the odds if you can't find your model among them. And once you boot up the program, you'll be happy to find that, not only does PowerLine provide scripts for logging on to most of the commercial bulletin boards, it even comes preloaded with a database of local access numbers for popular online and E-mail services such as CompuServe, GEnie, and Tymnet.

PowerLine offers a host of other ease-of-use features, from its user-modifiable tool bar, which sports colorful icons for accessing virtually any of the program's commands, to its hierarchical phone book that makes setting up a dialing queue and finding the session you want to load a breeze. For some reason, however, the program doesn't pop

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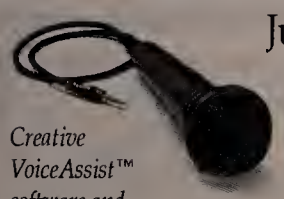

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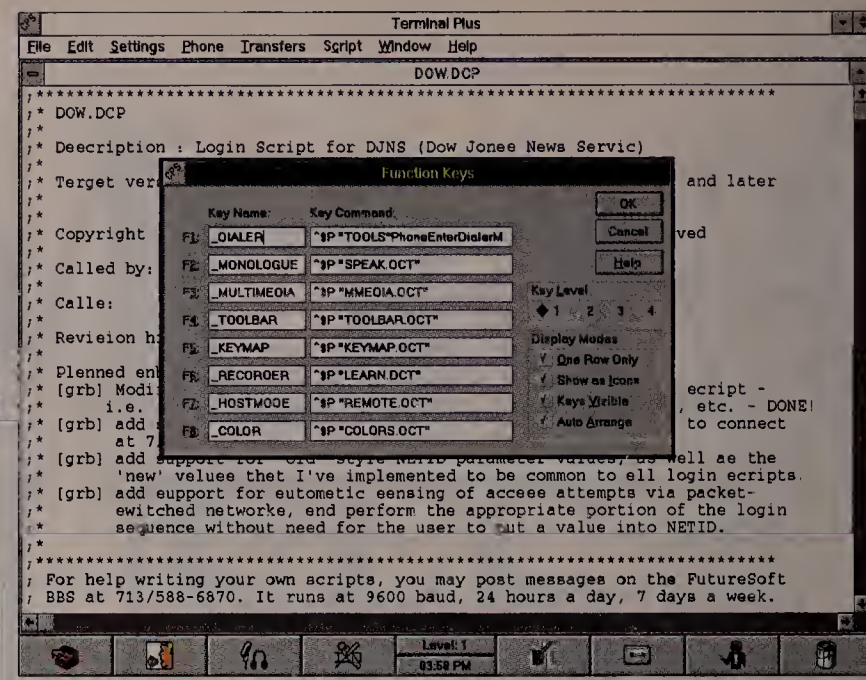
POWERLINE'S INTERFACE EXUDES ease of use, as exemplified by its point-and-click dialing utility and the floating tool bar. You can quickly add text labels to the tool bar buttons.



TERMINAL PLUS DOESN'T OFFER a fancy iconized interface, but its Function Key utility lets you create a button bar for accessing your most frequently used scripts and key commands.

the phone book up at the beginning. Instead, it loads your most recently connected session, and you have to select the phone book from the tool bar.

It's just as well that much of the program is intuitive, because PowerLine's documentation could use some work. The manual is more than adequate, with clear explanations of program features. But the online help barely cuts the mustard, lacking the hypertext links and illustrations that other programs have employed.

There are a few other oversights that may discourage some power users. For example, you can load only a single session at a time, and the program doesn't automatically adjust its share of CPU time for background transfers. Nor does PowerLine allow you to password-protect remote accesses, though it does let you limit remote users' access to a selected directory. Finally, the only network protocol supported is Int 14.

PowerLine attempts to make script writing easier by using a variant of BASIC as its scripting language—supplying more than 200 commands—and provides its own editor. There's no step-through debugger, however, for working out problems in scripts you've written.

PowerLine supports most of the popular file transfer protocols and terminal emulations. With that in mind, the program's ease of use and its modest $149 price tag make PowerLine worthy of consideration by budget-conscious users.

PowerLine 1.1, Enable Software; 800/888-0684, 518/877-8600. List price: $149. **Reader service no. 634**

FutureSoft: Terminal Plus with FaxIt 3.1.04

PROS: Low price, solid performance

CONS: Slow file transfers, limited transfer protocols and emulations, bare interface

Users will appreciate Terminal Plus's most noticeable strength before they even open the box: At $69.95, the program is less than half the price of all other programs in this comparison. Sure, you're not getting all the bells and whistles the other programs offer, such as exotic file emulations and network support, but if you don't need those things, why pay for them?

Terminal Plus—an enhanced version of Windows' Terminal utility—provides nearly all the basics that users look for in a communications package. To begin with, most popular file-transfer protocols are supported, though there is no proprietary protocol for high-speed linkups. And Terminal Plus supports the most commonly used terminal emulations, extending the three emulations supplied with Terminal (TTY, VT-52, and VT-100) to include ANSI and VT-220.

Inexperienced users will be pleased with FutureSoft's bundled grab bag of prewritten scripts, including several for logging on to the most popular online services. FutureSoft has also taken unusual care of new users by providing an online tutorial that gives a good overview of program features. And the program's skimpy manuals have been supplemented by better-than-average online help that is not only more thorough than the manuals, but is hypertext linked to make it more navigable as well.

And that's not all. Terminal Plus is one of only two programs to send and receive faxes on your computer, with the bundled FaxIt program. And even though Terminal Plus carries a bargain-basement price, it offers a strong scripting language, a subset of the language that comes with DynaComm, Terminal Plus's more expensive sibling. Still, though Terminal Plus represents a low-cost alternative for those not needing power features, the program fails to provide some that even low-tech users can use. For example, the program doesn't let you have multiple session files open at one time, nor does it provide host-mode features beyond the bare capability to answer an incoming call.

But perhaps the most daunting hurdle for new users is Terminal Plus's interface. Considering this is one of the original Windows communications programs, it's surprising that FutureSoft didn't add icons, scroll boxes, and other convenience features that Procomm and Crosstalk, among others, have implemented. Nevertheless, considering Terminal Plus's low cost, this program represents a strong value for those with only basic communications needs.

Terminal Plus with FaxIt, FutureSoft Engineering; 713/496-9400, 713/496-1090 (fax). List price: $69.95. **Reader service no. 635**

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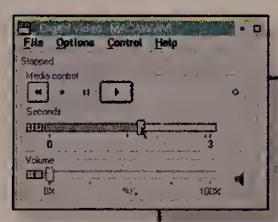

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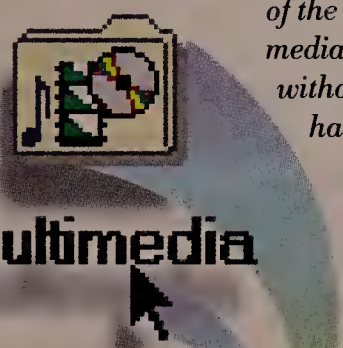

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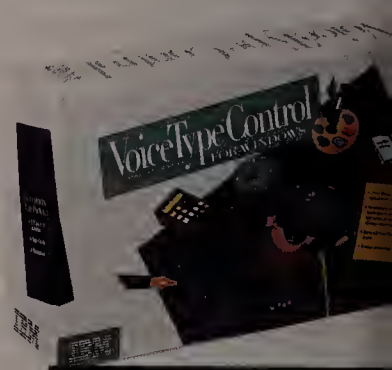

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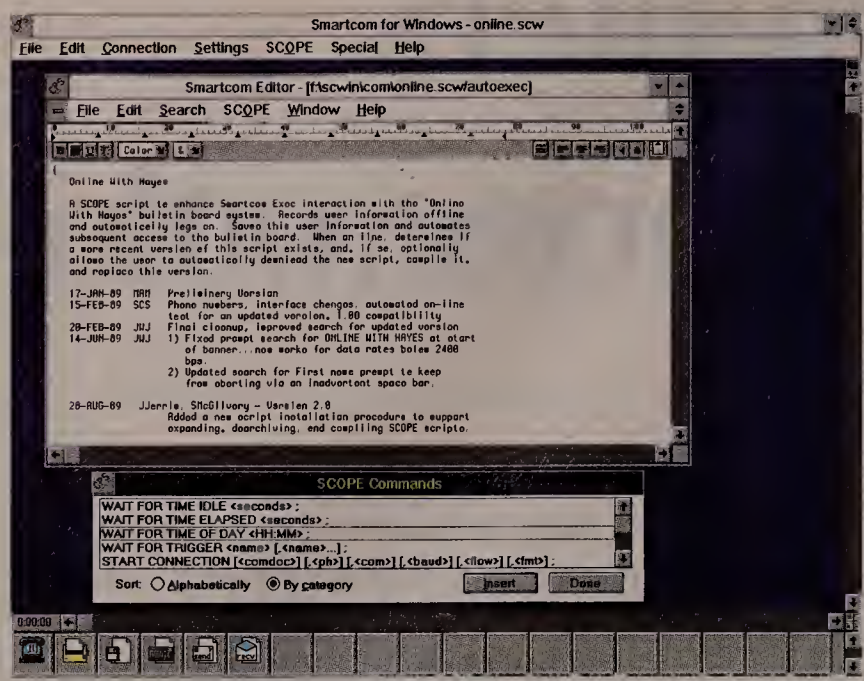


HAYES' SMARTCOM FOR WINDOWS emphasizes ease of use, even with such difficult operations as editing scripts. Smartcom provides a scrollable list of script commands, shown in the SCOPE Command dialog box, which lets you pop commands directly into the script.

Smartcom also has some notable weaknesses. The program eats memory—requiring 910K to load its basic module—and doesn't offer modem configuration files for any modems but Hayes's, a failing the company says it will rectify in the next version.

Some users will find the program to be modular to a fault. Activate the Smartcom icon, for example, and you can create new communications settings. But you won't find the GIF graphics viewer, the editor, or access to the program's customizing utilities—those are separate programs that must be activated from their own icons in the Smartcom program group. You can, however, integrate the program yourself by adding those utilities—or any other Windows applications—to a session's button bar.

Hayes also takes the concept of modularity a bit too far in the program's documentation. In addition to the user's manual, there are reference manuals for the scripting language, the editor, and communications. Each of the manuals is generally well written and liberally illustrated.

The online help is likewise well designed, with many illustrations and hypertext links to related topics. Unfortunately, Smartcom does not provide a utility for converting dialing directories from the DOS version to the Windows version.

Finally, Smartcom doesn't provide any special support for remote access—no callbacks, passwords, or access logs.

So why consider Smartcom over the competition? For one, Smartcom is one of the lowest priced products in this comparison, with a list price of $149. (Even better, Hayes has been selling the program at an introductory price of only $49 and recently extended the introductory period through the end of October.)

Second, Smartcom also offers some features not found in most of the competition, including unusually strong network support. The program can be used with NASI, NetBIOS, Int 14, and even ISDN protocols. Smartcom is also one of the few programs to provide a GIF viewer, handy for quickly looking at downloaded files in that graphics format.

Smartcom for Windows 1.0, Hayes Microcomputer Products; 800/964-2937, 404/840-9200. List price: $149. **Reader service no. 637**

Hilgraeve: HyperAccess for Windows 1.01

PROS: Fast proprietary file-transfer protocol, remote access with callback, virus scanning, adjusts share of CPU for background transfers

CONS: No script debugger, frilly interface

HyperAccess doesn't have the prettiest front end—and it certainly doesn't have the name recognition of Crosstalk or Procomm—but it is clearly the strongest all-around Windows communications package.

The program's 16 terminal emulations and 10 file-transfer protocols cover all the bases. And like Crosstalk, HyperAccess provides a proprietary file transfer format for extra-high–speed communications with other computers running HyperAccess.

A number of other features distinguish HyperAccess from the competition. It is the only program that lets you specify on a session-by-session basis the amount of CPU time the program should demand. You can set each session to have low-, normal-, or high-priority access to CPU time, and the program automatically adjusts to demand more CPU depending on whether it's running in the foreground or background.

HyperAccess is also the only Windows communications package here that can be configured to automatically call back a remote user—a great feature if you're trying to access your own computer from a hotel room and don't want to run up inordinate phone bills. In addition, the program provides a suite of security features to control remote users' access.

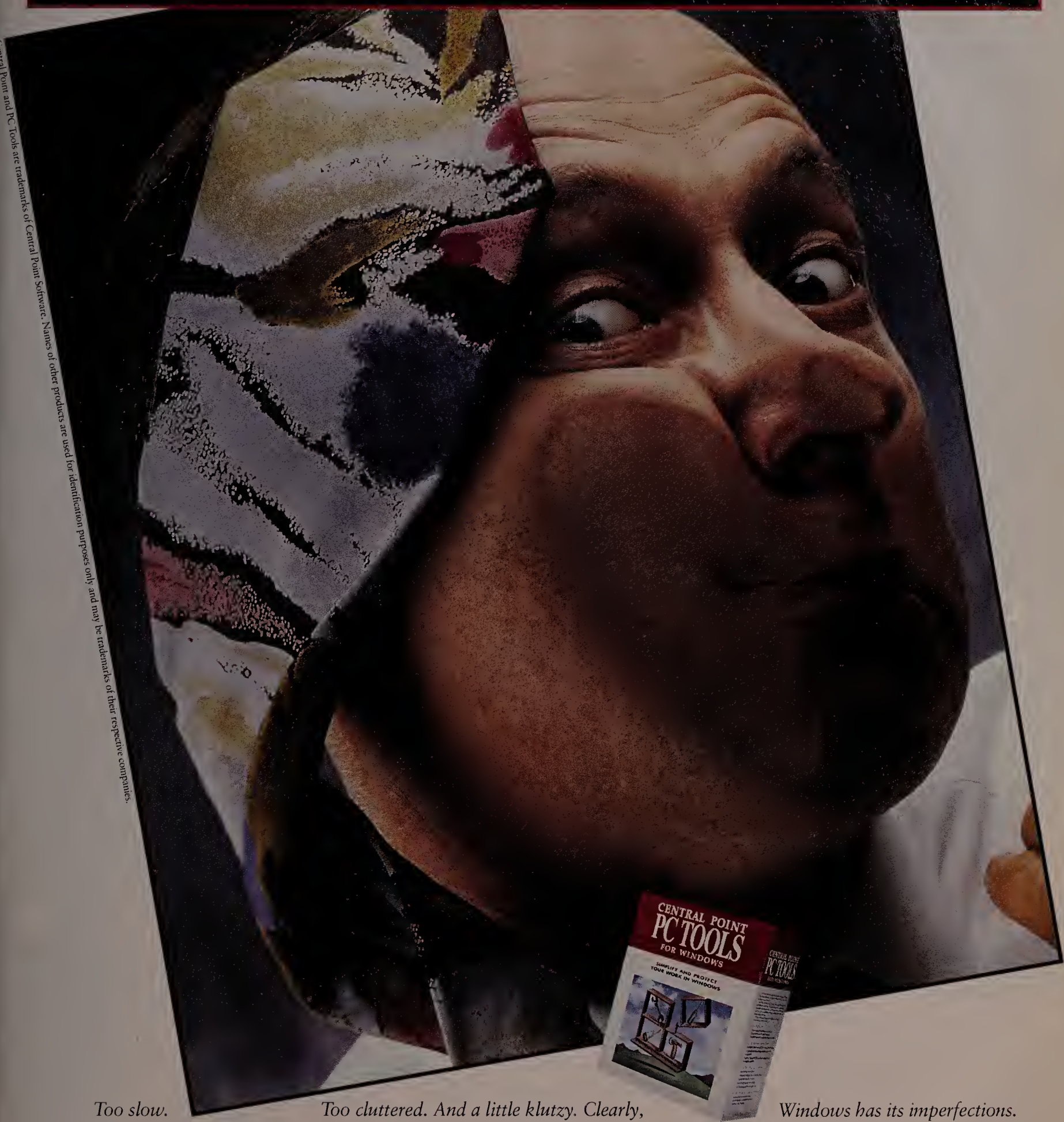
Another unique feature is that all HyperAccess's documentation is in one manual. Since the program doesn't provide its own scripting language, there is no script reference manual.

The program's context-sensitive and searchable online help is well written and extensive. Hypertext linking of help topics makes it easy to find answers.

Finally, HyperAccess can automatically scan downloaded files for viruses, a potentially useful feature that no other communications

ONE OF THE MANY FEATURES that makes HyperAccess a Best Buy is its healthy collection of file-transfer protocols, including its own fast proprietary method, HyperProtocol.

No doubt you've experienced the limitations of Windows.



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package offers. Unfortunately, HyperAccess can't virus-scan compressed files, and that's the way most serious users transfer files.

If HyperAccess has a general weakness, it lies in the interface, which is perhaps a bit too clever. A chick hatching from an egg represents the New Session command, for example. And a soda bottle with fizz coming out represents Open. While such icons are cute, they can be confusing. The text boxes that pop up when you open a session seem peculiarly sized and placed, and they don't resize as you would expect when you expand or contract the session box. The result is, at least for some users, an unsettling feeling of not being certain just how the interface works. One other potential drawback is that HyperAccess does not provide a utility for converting phone directories from the DOS version of the program.

HyperAccess doesn't have the prettiest front end—and it certainly lacks the name recognition of Crosstalk or Procomm—but it is clearly the strongest all-around Windows communications package.

Those caveats aside, HyperAccess is arguably the best choice for all but two categories of users: people on networks and heavy script users. Network users, especially those on NetWare networks, should note that HyperAccess supports only Int 14 and TCP/IP protocols, not NetWare's NASI protocol. If you need scripting tools, HyperAccess relies on scripts written in C and does not include its own scripting language or debugger.

By virtue of its ease of use and grab bag of extra features, HyperAccess earns *PC World*'s Best Buy.

HyperAccess for Windows 1.01, Hilgraeve; 800/826-2760, 313/243-0576. List price: $199. **Reader service no. 638**

Software Ventures: MicroPhone Pro for Windows 1.0

PROS: Good script editor, fax program bundled

CONS: Limited file transfer protocols and modem configuration files, doesn't relinquish serial port

MicroPhone Pro is one of only two programs in this review to offer fax. Nonetheless, datacomm features, performance, and usability are the focus of this roundup. While MicroPhone Pro shows some real strengths in that regard, it falls short in several key areas.

For example, MicroPhone Pro provides only six file-transfer protocols—lacking, among others, CompuServe and Kermit protocols—and only six terminal emulations. The program is also relatively inflexible when working with other programs. It doesn't, for example, adjust its share of CPU time when working in the background, and it grabs control of the COM port even when it's not in use. The program's modem support is limited to only 39 models.

MicroPhone Pro's interface is a bit confusing; the program's main module is a bare window with a small bar of menu selections for creating new sessions. The sessions are saved as separate icons within the Windows program group, not within a phone directory screen. If you maintain a number of icons, you'll either have to repeatedly scroll the icon window or MicroPhone Pro's group will take an increasingly large share of your Program Manager screen.

The program provides tools to customize session screens. You can, for example, attach scripts to a button bar for quick access. Unfortunately, there are limited controls over the size and type of buttons, and we found it difficult to get the buttons to properly display type.

MicroPhone Pro's manuals are thorough, but they're a bit densely written and in need of more illustration. The online help has few hypertext links.

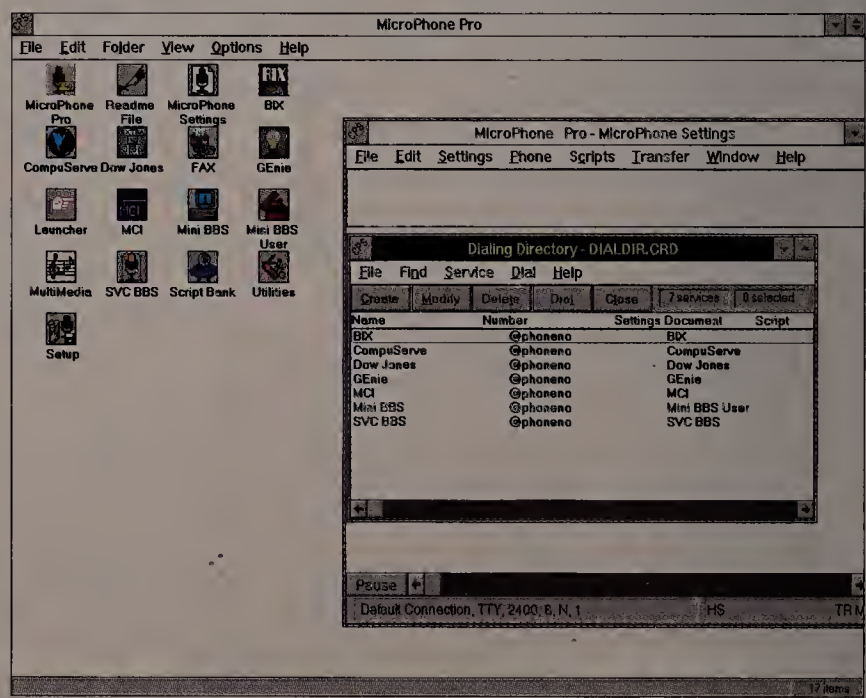
MicroPhone is lacking in certain categories, but it offers a number of surprises, including a nice remote-access feature called the Mini BBS. Any user who calls is automatically prompted to provide a password for use in subsequent connections. Users receive a security level of 1, which allows them only to read and write messages. The host operator can later upgrade a user to level 2, which lets the user upload and download files, or to level 3, which gives the user administrative powers to set up new accounts for other users and to change all passwords.

Curiously, however, MicroPhone Pro's Mini BBS won't record remote accesses in the program's call log, nor will it restrict the directories that a remote caller can access.

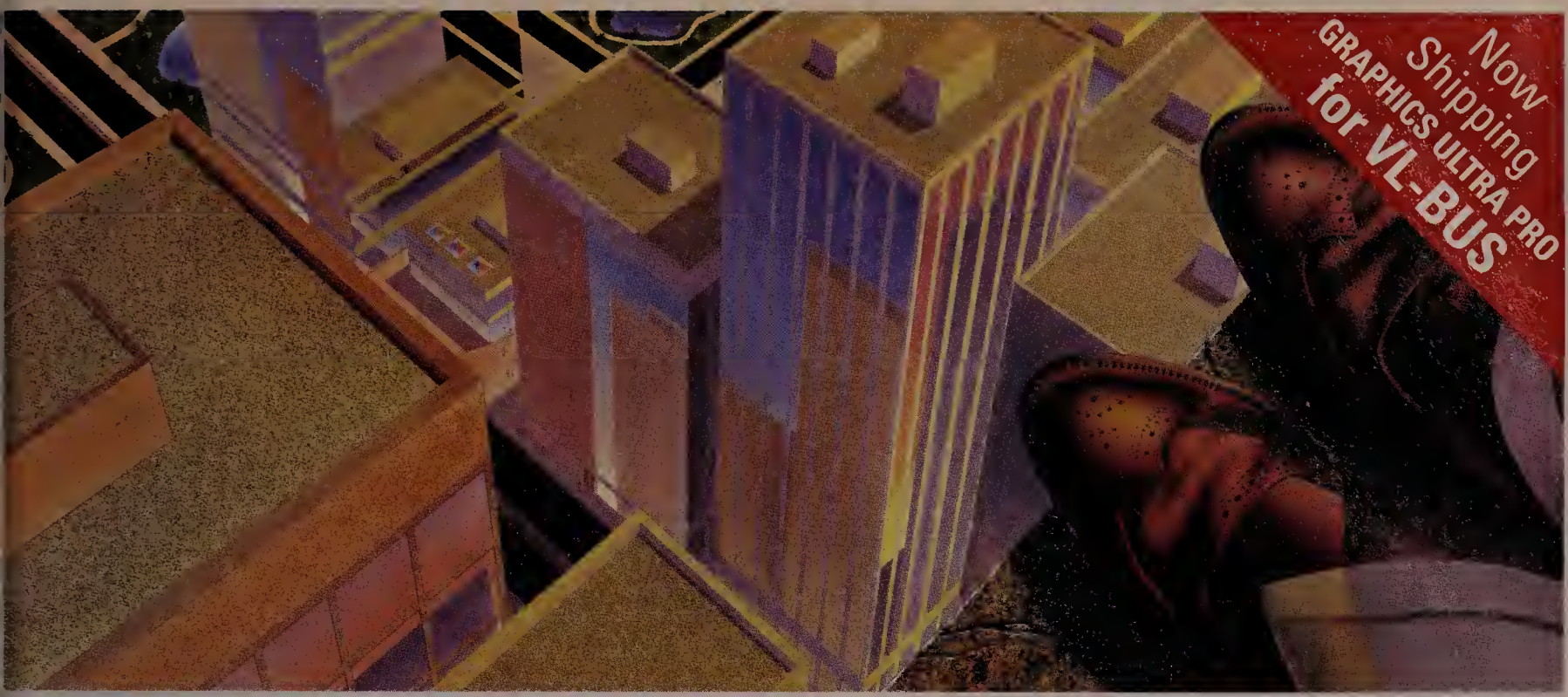
Another surprise is MicroPhone Pro's script editor. In addition to a respectable command set, the built-in editor/debugger offers a scrollable list of those commands, so finding the appropriate verbs and syntax and popping them into the script you're creating or editing is simple. The integration of the WinFax Lite fax program is another pleasant discovery.

Finally, MicroPhone Pro also provides better-than-average support for redirection protocols, allowing you to use up to nine COM ports and NASI, NetBIOS, and several other network protocols.

MicroPhone Pro for Windows 1.0, Software Ventures Corp.; 510/644-3232, 510/848-0885 (fax). List price: $195. **Reader service no. 639**



MICROPHONE PRO IS PRELOADED with session files for many of the more popular online services, and it's one of the few communications programs to offer bundled and integrated fax capabilities.



Don't Jump to a Graphic Conclusion

If you're about to take the plunge on a new graphics accelerator, get one that won't limit your future. ATI's GRAPHICS ULTRA+ and GRAPHICS ULTRA PRO give you no-regrets performance with all of today's applications. And they're perfectly poised for the leap forward into 32-bit operating systems and multimedia applications.

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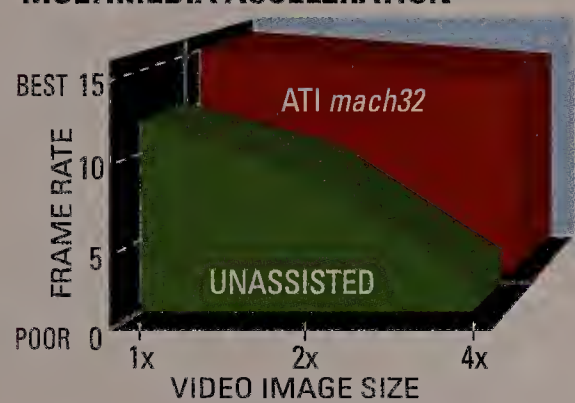

Software Safety Net

Software driver support shouldn't have to be a giant leap of faith... but without it, an accelerator is just an expensive VGA card. ATI gives you the best driver selection with the full security of 8514/A-compatible acceleration, plus up-to-the-minute ATI drivers for all major applications, including 32-bit environments, like OS/2 2.1 and Windows NT.[1]

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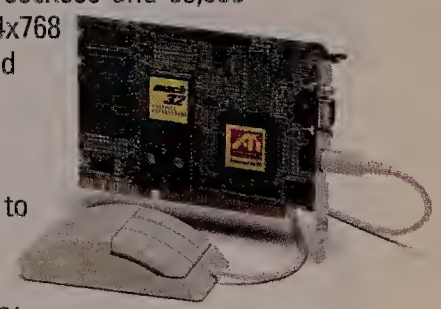

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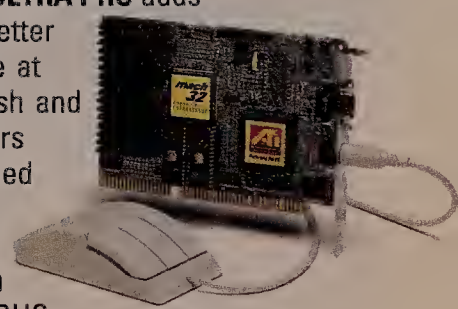

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Circle 5 on reader service card

FEATURES COMPARISON

Windows Datacomm Programs: Your Choices Broaden, Slowly

● Yes
○ No
▼ Limited only by available disk space or memory

	Datastorm: Procomm Plus for Windows 1.02	BEST BUY DCA: Crosstalk for Windows 2.0.1	Enable Software: PowerLine 1.1	FutureSoft: Terminal Plus with Faxit 3.1.04	FutureSoft: DynaComm for Windows 3.1.03	Hayes: Smartcom for Windows 1.0	BEST BUY Hilgraeve: HyperAccess for Windows 1.01	Software Ventures: MicroPhone Pro for Windows 1.0
Program features								
List price	$179	$195	$149	$69.95	$249	$149	$199	$195
Fax capability	○	○	○	●	○	○	○	●[1]
Graphics viewer	●[3]	○	○	●	●[2]	●	○	○
Scrollback buffer size	31 pages	256 pages	150 pages	399 lines	399 lines	▼	5000 lines	40,000 lines
Queue files for downloading	●	○	●	●[4]	●[4]	○	○	○
Open multiple sessions	●	●	○	○	○	●	●	●
Run multiple sessions	●	●	○	○	○	○	●	●
Queue files for sending	●	●	○	●[4]	●[4]	●	●	●
User-selected CPU share	○	○	○	●	●[5]	○	●	○
Auto-adjust CPU share	●	●	○	○	○	●	●	○
Relinquish COM port when inactive	○	●	○	●	●	●	●	●
Terminal emulations	34	22	6	6	16	9	16	6
Number of entries per phone directory	250	▼	▼	200	200	▼	▼	▼
Log connections in	●	○	○	○	○	○	●	○
Log connections out	●	○	●	○	○	○	●	●
Queue calls	●	●	●	●	●	●	●	●
Installation and configuration								
Modem configuration files	435	108	428	179	179	1	198	39
Windows memory used (K)	300	430	600	330	300	910	290	910
Disk space required (MB)	4	4.5	1	3.6	4.25	4	1.8	2
Speeds supported (bits per second)	300-115,200	300-115,200	300-115,200	300-115,200	300-115,200	110-115,200	300-115,200	50-115,200
Remote access								
Callback feature	○	○	○	○	○	○	●	○
Passwords	●	●	○	●	●	●	●	●
Control directory access	●	●	●	○	○	○	●	○
Public messages	●	●	○	●	●	○	●	●
Store messages from users	●	●	○	●	●	○	●	●
File transfer protocols								
Number	12	15	10	9	9	8	10	6
CompuServe B	●	○	●	●	●	○	●	○
CompuServe B+	●	●	●	○	○	●	●	○
Kermit	●	●	●	●	●	●	●	○
XMODEM	●	●	●	●	●	●	●	●
XMODEM-G	●	●	○	○	○	○	○	○
XMODEM-1K	●	●	●	●	●	○	●	●
XMODEM CRC	●	●	●	●	●	●	●	●
YMODEM	●	●	●	●	●	●	●	●
YMODEM-G	●	●	●	●	●	●	●	●
Z-MODEM	●	●	●	●	●	●	●	●
Scripting								
Number of commands	353	239	200+	200	330	123	Uses C	222
Recording feature	●	●	●	●	●	●	●	●
Editor	○	●	●	●	●	●	○	●
Script debugger	●	●	○[6]	●	●	●	○	●

[1] Bundled with WinFax Lite. Scripts available to integrate the fax and data programs.
[2] GIF and RLE files.
[3] GIF files.
[4] Script included.
[5] Can adjust for both file transfers and online sessions.
[6] Compiler posts numbers of error lines.

Eclipse FAX: If It Were Any Faster, You'd Have To Send And Receive Your Faxes Internally.

Here's the inside story on Eclipse FAX - the fastest, easiest Windows fax software available today. With Eclipse FAX, you save time since all your faxing is done from your own personal computer. You can fax to or receive from any fax machine and easily track, file, mark-up and store your faxes.

With a click, you can send or receive a fax - even if you're in a word processor or other Windows application - without being interrupted. And Eclipse FAX also includes OCR, which converts your faxes into editable text.

Of course, the nature of fax software has other unbeatable benefits. Like the ability to annotate and type comments on faxes with your PC; the ability to print out plain paper faxes from your PC; and the privacy and convenience of faxing from your own personal computer.

If you already own a fax software program, we'll let you trade up to Eclipse FAX for just $59*. So pick up Eclipse FAX, because to fax any faster, you'd have to break a few laws. Of physics.

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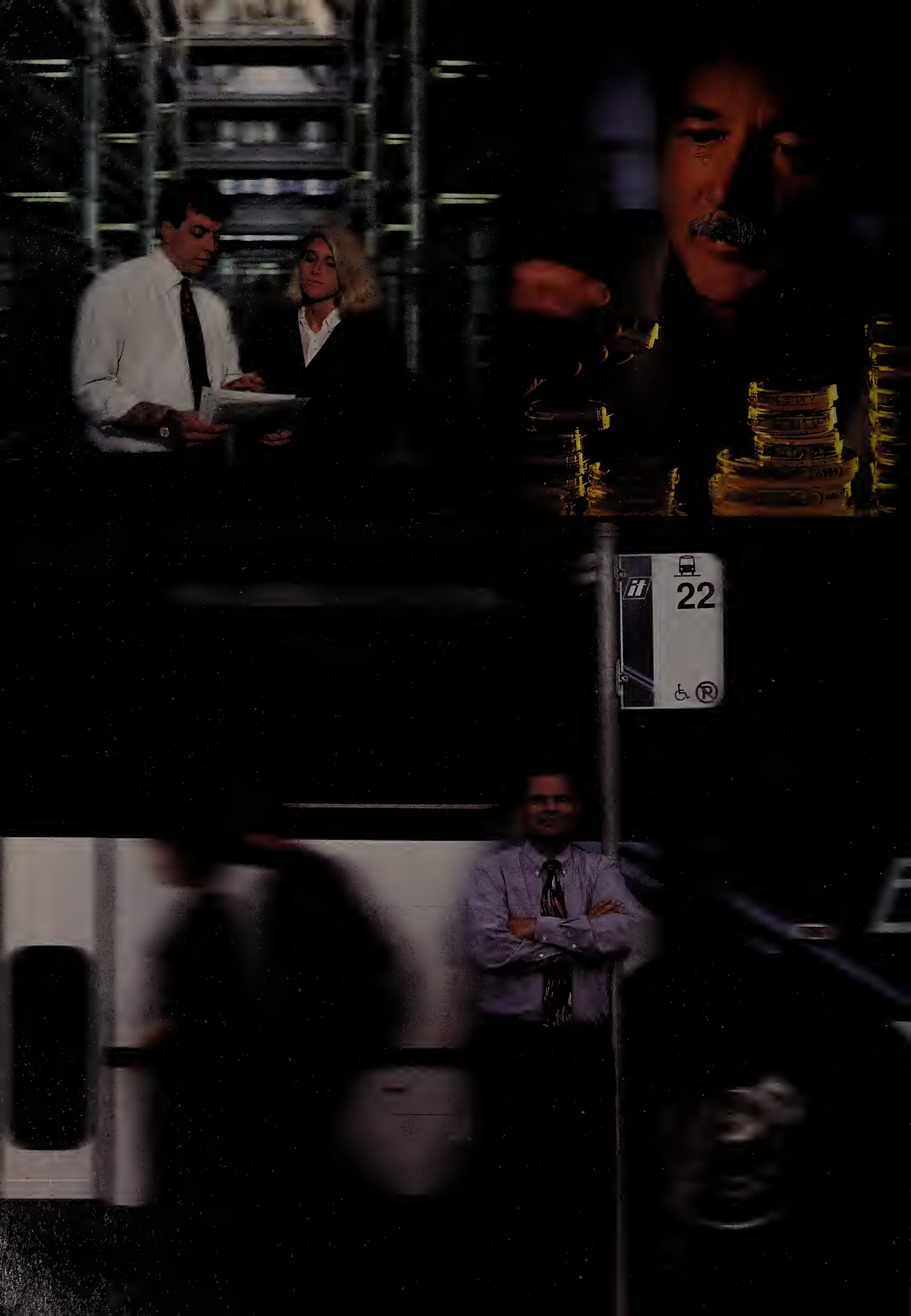
Windows Magazine 1993 Recommended

PC Magazine 12/8/93 Editors' Choice

Mobile Office Magazine 1993 Best of the Year

Circle 211 on reader service card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Now everyone can get access to data.

The Commercial Office Supply Division at 3M® is always on the lookout for new product ideas. After all, the next Post-it™ note could be right around the corner. But until recently, they were missing a way to organize all of the "product wishes" floating around their department into a format everyone in the group could easily share and use.

"Our information was in a variety of locations: filing cabinets, notebooks, people's heads," recalls Bob Wolf, 3M Product Development Engineer. "The business problem we had was not being able to access our information effectively." They chose Microsoft Access to build their database of ideas, maintain mailing lists, generate surveys, and more. "It saves time in training, in building the databases, and it saves time in accessing the information." Which leaves more time to concentrate on turning wishes into the products people want.

Managing data and reporting are easier.

Scott Emmons, Professor of Molecular Genetics at Albert Einstein College of Medicine, spends a lot of time with worms. Thousands of them. As a basic research tool, nematode worms are a valuable part of learning how DNA forms the blueprint for life. For Scott, managing the variety of data associated with each different mutant worm strain—and being able to generate reports on his research quickly—is critical to keeping his lab running smoothly. He turned to Microsoft Access.

"A major part of the way I'm using Microsoft Access is the reports that I generate," says Scott. "I can sort the data a number of ways, and the ease of use means I can quickly scan these reports to locate a particular strain." And that means a lot less strain on Scott.

The uses are endless.

Intercity Transit in Olympia, Washington, recently moved from Paradox® because of the superior reporting capabilities in Microsoft Access, and its interoperability with other Microsoft applications. "To go with our suite of Microsoft® Office products, we felt it was the best choice for us," explains Richard Madrid, Intercity Transit MIS Specialist.

Today, Intercity Transit relies on Microsoft Access to keep them running—literally. By using it to maintain and generate timetables for bus riders and drivers, they've all but eliminated scheduling errors, and saved countless hours of proofing and information-transfer time. Plus, they can track ridership by customer segment and keep tabs on the productivity of every route. Now they plan to use Microsoft Access to help grow their rideshare program.

"Microsoft Access has given us a lot of capabilities, not just report writing, but access to the data, and configuring it the way we need it for reporting and tracking," notes Richard. "Plus it's easy, so people are happy." And that's bound to keep Intercity Transit headed in the right direction.

Now everyone in your organization can work smarter—if they work with Microsoft Access. If you use another database or any Microsoft Office program, you can take advantage of our special $149** offer today, which includes a 90-day money-back guarantee. Then you can create your own success story. When you do, we'd love to hear it—simply write to: Microsoft Access Product Manager, One Microsoft Way, Redmond, WA 98052.

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Hardware Review,
United Feature Syndicate

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Tips for

You've just come back from vacation, and you're feeling quite relaxed. You boot your PC, load your E-mail program—and suddenly that sense of well-being disappears. You have 100 new messages—not to mention dozens of voice mail messages, a stack of unread memos, and a huge pile of letters.

Even if you're not on vacation, E-mail messages have a way of building up. You need to be able to find and filter critical messages you've received, keep a log of messages you've sent, store related messages in folders, and archive old messages. Otherwise your E-mail becomes as disorganized as a hard disk without subdirectories, consuming precious disk space.

To make these management tasks easier, we've compiled a selection of tips for the most popular E-mail packages—cc:Mail, Microsoft Mail, and WordPerfect Office Mail. You'll find strategies for the DOS, Windows, and remote versions of these packages, all designed to enhance your personal productivity through activities such as quicker searching, better management, and improved editing. These tips won't make E-mail messages go away, but they will help you avoid information overload.

cc:Mail for DOS/cc:Mail for Windows

Keep a Message Log

Want to be sure who said what to whom? Instead of copying yourself on every message you send, you can create a Message Log folder if you use cc:Mail for DOS 3.2 or later or cc:Mail for Windows. In DOS versions before 4.0, select *Manage mailbox* from the main menu, then select *manage Folders*, type **Message Log**, press **<Enter>**, and press **<Esc>** twice. In 4.0, you can use the Manage mailbox menu's *create message Log* command. cc:Mail for Windows 2.0 automatically creates the Message Log folder; for earlier versions, click on the *Folders*

you use, here are dozens of strategies for making E-mail work for, not against, you.

Taming E-Mail

icon, select *File•Create Folder,* type **Message Log**, and select *Create* and then *Done.* cc:Mail creates the folder and automatically routes to it a copy of every message you send. (If this technique doesn't work, ask your E-mail administrator to enable the Message Log function.) Don't forget to delete unwanted messages regularly; they'll build up fast. Also, archive messages you need to keep; the E-mail administrator may delete old messages from your Message Log folder periodically.

Commenting on Messages

cc:Mail allows you to return a message with your comments to the original sender. But if many people add comments to the same message, it gets difficult to tell the comments apart. One easy solution is to use cc:Mail's color annotation feature. While viewing the message you want to comment on, press **<Alt>-<F1>** to see the color choices. Use the **<Up>** and **<Down>** cursor keys to select a background color and the **<Left>** and **<Right>** keys to select a foreground color. Press **<Enter>** to select the color combination. Any text you enter into that message will appear in those colors. In the Windows version of cc:Mail, simply press the right mouse button while the mouse pointer is in a message, and a color palette will pop up.

Keeping Track of Remote Users

Ever wonder if a cc:Mail Remote user has downloaded a message you sent? You can request a receipt, but there's a sneakier way to check if the user has logged in. From the cc:Mail for DOS main menu, select *Prepare new message,* then select *Address to person* and type the first few letters of the remote user's name until it's highlighted. When you find it, look in the Last Checked In column of the address list to learn when the user last logged on. Now hit **<Esc>** twice to get back to the main menu without creating a message. In cc:Mail for Windows, simply type **<Alt>-D** to get the directory. Type the first letter of the user's first name, and if necessary, use that letter again or <Down> to scroll through the list until you find the name. The Last Logged In column tells when the user last checked for messages. Of course, you can't tell that the recipient has actually read the message—just that it's been downloaded into his or her Inbox.

Speedy Message Selection

With a few simple tricks, you can select groups of messages more quickly and delete, move, or archive them all at once. In cc:Mail for DOS, select individual messages by cursoring to them and pressing **<F5>**; to select a group of consecutive messages, go to the first message, press **<F5>**, scroll down to the last message, and press **<F6>**.

In cc:Mail for Windows, you have more options. To select a group of consecutive messages, click on the first one, then go to the end of the list, press **<Shift>**, and click on the last message; the selected messages will be highlighted. To select nonconsecutive messages, hold down **<Ctrl>**, then click on the desired messages (or also hold down **<Shift>** and click to select another group of consecutive messages).

To copy messages quickly in cc:Mail for Windows 1.0, click the *Folders* icon and select *Window•Tile* or press **<Shift>-<F4>** to position both the Inbox and the Folder List windows on screen. In cc:Mail for Windows 2.0, expand the Folders container in Mailbox window's container pane. Then for either version, select the Inbox messages you want to copy and drag them to the folder of your choice. (To move instead of copy, hold down **<Ctrl>** while you drag them.)

Archive Old Messages

Many people accumulate hundreds of messages because they can't figure out how to

EDITED BY ANITA AMIRREZVANI

archive them. In cc:Mail for DOS, press **<F5>** to select the messages you want to archive, press **<Enter>**, then select *archiVe messages*. Enter the name of the archive file, and the messages will be saved there. Select *Return to main menu*.

The next time you want to archive messages, follow the steps listed above, choose the archive file, and the messages will be appended to it. You can fetch archived messages from the main menu by selecting *reTrieve message•retrieve from archiVe file*.

In cc:Mail for Windows, simply highlight the messages you want to archive; select *File•Store Message* or press **<Alt>-T** in version 1.*x*, or select *File•Store* or press **<Ctrl>-T** in 2.0; type in a file name; select *Copy* or *Move;* click the *Archive* button in version 1.*x* or select the archive folder in 2.0; and click *OK*. In the Create Archive dialog box in version 1.*x*, choose the archived file's destination directory from the Directories list box and click *OK*.

Don't Bother Me

In cc:Mail for Windows 2.0, you can click the *Configure* button, select *Notify* in the Preference list, and deselect the Notification Method's boxes. But, whether you like it or not, cc:Mail for Windows 1.*x* notifies you every time you get a new message. Choose *File•Options•Notify*, and the program lets you decide whether you want to be notified by some combination of a dialog box, a flashing program icon, or a beep. If you get messages constantly, however, you may want to disable notification entirely. Here's how. In Program Manager or File Manager, choose *File•Run* and type **WIN.INI** to open that file in Notepad. Search for **[cc:mail]** and underneath that heading, add **Notify=0** on its own line. (If the 'Notify' line already exists, edit it.) Then save WIN.INI. The next time you get a message, you won't be notified. If you change your mind, you can always reactivate notification by selecting *File•Options•Notify* and clicking the *Notify Dialog* or *Flash Window* radio button or the *Tone* check box.

Folders on the Fly

Want to create a folder on the spur of the moment? In cc:Mail for DOS, you can do it the traditional way by selecting *Manage mailbox*, then *manage Folders*, and entering a new folder name at the prompt. But there's a faster method: Select the desired messages, press **<Enter>**, and select *Move* or *Copy*. At the prompt, type in the new folder name and press **<Enter>**. cc:Mail creates the folder and moves or copies the selected messages. In cc:Mail for Windows 1.*x*, you can choose *Select•Folders* and *File•Create Folder*, or better yet, select your message(s), select *File•Store Message* or press **<Ctrl>-T**, type the name of the new folder in the Name text box, and click *OK*. The steps in cc:Mail for Windows 2.0 are similar: Select the Inbox messages, select *File•Store* or press **<Ctrl>-T**, type the name for the new folder (or archive) container, select *Copy* or *Move*, click *OK*, select *Folder* or *Archive*, and click *OK*.

Customized cc:Mail for Windows Icons

When you install cc:Mail for Windows 1.*x*, its SmartIcon tool bar doesn't include the Print icon. To add that icon (or any other), select *File•Options•SmartIcons* to display the SmartIcons dialog box, and click the *Show Text* check box so each icon displays with a description. Then click *Customize*, and the icon palette appears. On the left are available icons, and on the right in the order they appear are the icons on your current tool bar (see **FIGURE 1**). Use the right scroll bar to scroll to the end of the Current palette, then scroll the Standard icons until you can see the Print SmartIcon, and drag it into the Current palette box.

Don't put the Print SmartIcon next to the Delete icon—it's too easy to delete messages that you intended to print! Better yet, put the Delete SmartIcon all by itself, with blank spaces (found in the Standard icon box) on either side, so you don't delete anything by accident.

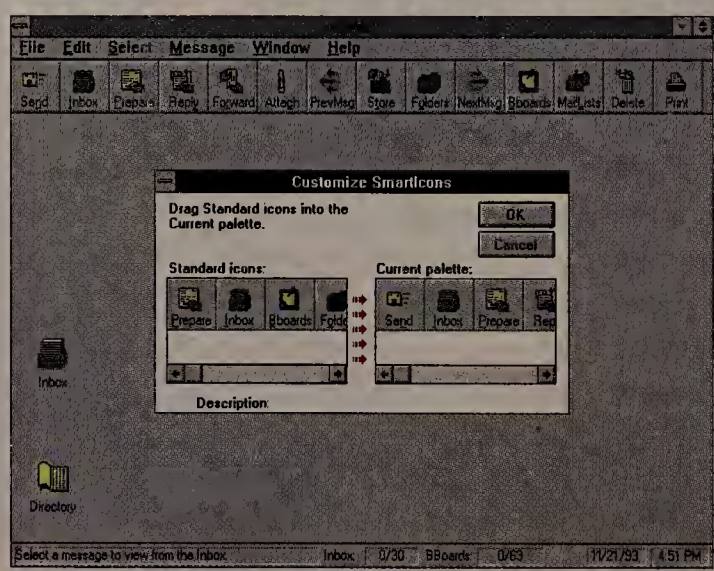


FIGURE 1: CUSTOMIZE CC:MAIL'S SMARTICONS palette by dragging icons from the Standard icons box into the Current palette box.

To get rid of unwanted icons, just drag them out of the Current palette. Select *OK•OK*, and you're done.

cc:Mail Remote

Crisper Displays for Monochrome Screens

If you use a laptop, you probably have a monochrome VGA screen. But because cc:Mail Remote automatically loads in color mode, the program displays various shades of gray, which, depending on the color combinations people use, may yield unreadable results. For crisp black-on-white characters all the time, load cc:Mail in mono mode by entering **REMOTE MONO** at the DOS prompt in your cc:Mail directory. To avoid typing all those characters, create the following batch file, which assumes your version of Remote is on drive C: in a directory called CCMAIL:

```
C:
CD\CCMAIL
REMOTE MONO
```

Name it **CC.BAT** and save it in a directory listed in your AUTOEXEC.BAT's PATH statement. You can now just type **CC** to load cc:Mail in mono mode.

Fast Address Deletes

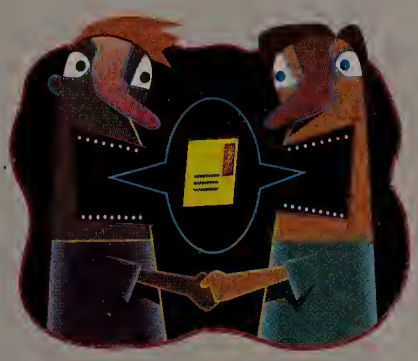
You've created a message, addressed it to two dozen colleagues, and now you're having second thoughts about sending a copy to the big boss. There's no need to delete the whole address list just to get rid of one or two names. cc:Mail lets you peel off names one at a time from the address list. Here's how to do it with cc:Mail Remote version 3.2 and cc:Mail for DOS.

In cc:Mail Remote, first select *reTrieve messages•retrieve from inBox/outbox*, press **<Enter>** if there's more than one message in your Outbox, use the cursor keys to highlight your message, and press **<Enter>**.

Press **F** to forward the message, then in the Address menu, press **O** to retain the original addressees and **A** to address it to a person. Scroll down to the person whose name you want to delete from the address list, just as you did when addressing the message originally. This time, instead of pressing <Enter>, press **<Delete>** (see **FIGURE 2**). Presto! The name vanishes. Press **<Esc>** to get out of your

E-Mail Etiquette

Ever sent a message and regretted it? Ever wondered how to convey a thought or feeling without tones or gestures? Where's Miss Manners when we need her? To set us straight, we asked for tips from people who have spent years wired to their terminals—Cliff Figallo, online communications coordinator for the Electronic Frontier Foundation; Michael Godwin, the EFF's legal counsel; and the *PC World* staff. Here's their hard-earned advice:



- Watch your language. Online communications can be depersonalizing, so subtleties such as sarcasm and joking may not come across the way you intended.
- When in doubt, use "emoticons" such as a rotated smiley face—(:—or <g> to signify "grin" to help recipients understand the message's intended spirit.
- Don't yell online. Capital letters, for example, can be obnoxious and difficult to read. Use your writing skills to convince or move your readers.
- When you respond to a message, send the original back with your reply. Otherwise, the sender may have no idea what you're talking about (especially if you favor snappy responses like "no way" or "great idea!").
- Don't send overly long messages. As a courtesy, ask recipients if they want to receive a long message first. Remote users, in particular, will thank you for not tying up their systems and raising their phone bills.
- Take a sharp look at your copy list. Does everyone really need to receive a copy, or are you being obsessive about covering your trail?
- Avoid "mailstorms." When you're the recipient of a message with a lot of cc'ed names, consider whether the whole group really needs to read your response.
- Don't use E-mail to do your dirty work. When you have to convey bad news, consider whether a phone call or personal visit will be better received than an online note.
- Scrutinize your address list. People have lost their jobs by accidentally forwarding messages to the wrong person. A little care will assure that you're not sending an employee evaluation to another employee, or a nasty note about the boss to the woman herself.
- Don't send a message you've written in an angry mood. Stick it in a drafts folder and read it again once you've calmed down.
- Don't respond to a message until you've read it entirely. Many people think as they write, so conclusions and recommendations often end up in the last paragraph.
- Edit thyself. There's nothing worse than a message that rambles on and on. —*A. A.*

mail directory, **N** to end addressing, and **S** to store the message in cc:Mail Remote.

But wait, you're not finished. cc:Mail Remote returns you to the original message—the one that has the boss's name still on the envelope. You still need to get rid of it. Press **<Enter>** to open the Action menu, **D** to delete, then respond **Y** to the confirmation prompt and **<Esc>** to return to the main menu. If you look in your Outbox, you'll see that only the amended message remains. Now you'll be able to send it with a clear conscience.

You ean use a similar technique to delete addresses in cc:Mail for DOS, either right before you send a message or when you retrieve a message from the Drafts folder. Retrieve the message if necessary, then press **A** to address the message, press **A** again to address it to a person, then select the name of the person you want to delete. Press **<Delete>**, and the name vanishes from the list. Delete any other names you want off the list; press **<Esc>** to continue as usual.

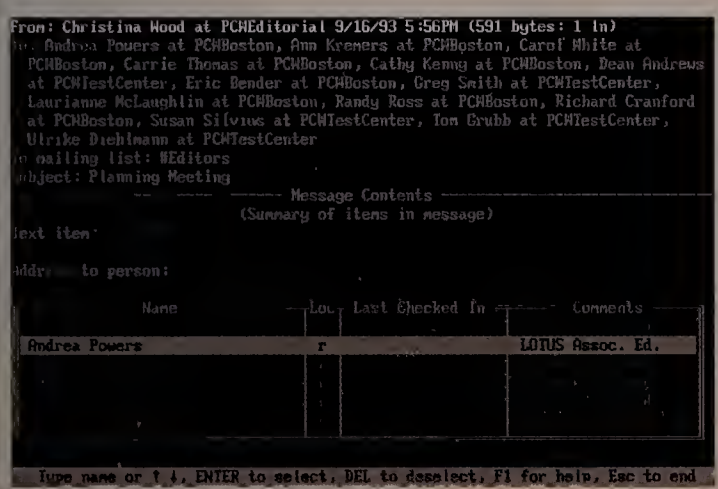


FIGURE 2: DELETE A NAME FROM A CC:MAIL address list even after you've stored the message. Just select the name and press <Delete> instead of <Enter>.

Prevent Monster File Downloads

Are people choking your modem by mailing you messages with 1MB files attached? There's an easy way to thwart them. Let's assume you keep your cc:Mail Remote files on drive C: in a directory called CCMAIL. Just open any text editor and create a batch file to call cc:Mail by entering the following lines:

```
C:
CD\CCMAIL
REMOTE MSGSIZE/100
```

Save the batch file under a memorable name such as **CC100.BAT** in a directory listed in your AUTOEXEC.BAT's PATH statement. When you don't have time to download large files, load cc:Mail by typing **CC100** at the DOS prompt so the package won't accept messages larger than 100K. (You can use larger or smaller numbers for K size, depending on what you want.) All messages 100K or smaller will come through nicely, regardless of whether they were sent after larger ones.

If you'd rather not receive any messages, use the command **REMOTE S/O**, which loads cc:Mail in send-only mode. Conversely, the read-only command **REMOTE R/O** lets you receive messages without disturbing the contents of your Outbox.

Not to worry; the messages you don't receive now will remain on the server. You can download them later by running your normal CC.BAT file.

Remote Clipping Tips

The Windows version of cc:Mail Remote isn't due out until the end of 1993. But you can still run the DOS version of Remote under Windows and use the Clipboard to cut and paste between cc:Mail and your Windows word processor. The secret is running cc:Mail in a window. Open your word processor, cc:Mail Remote, and the message

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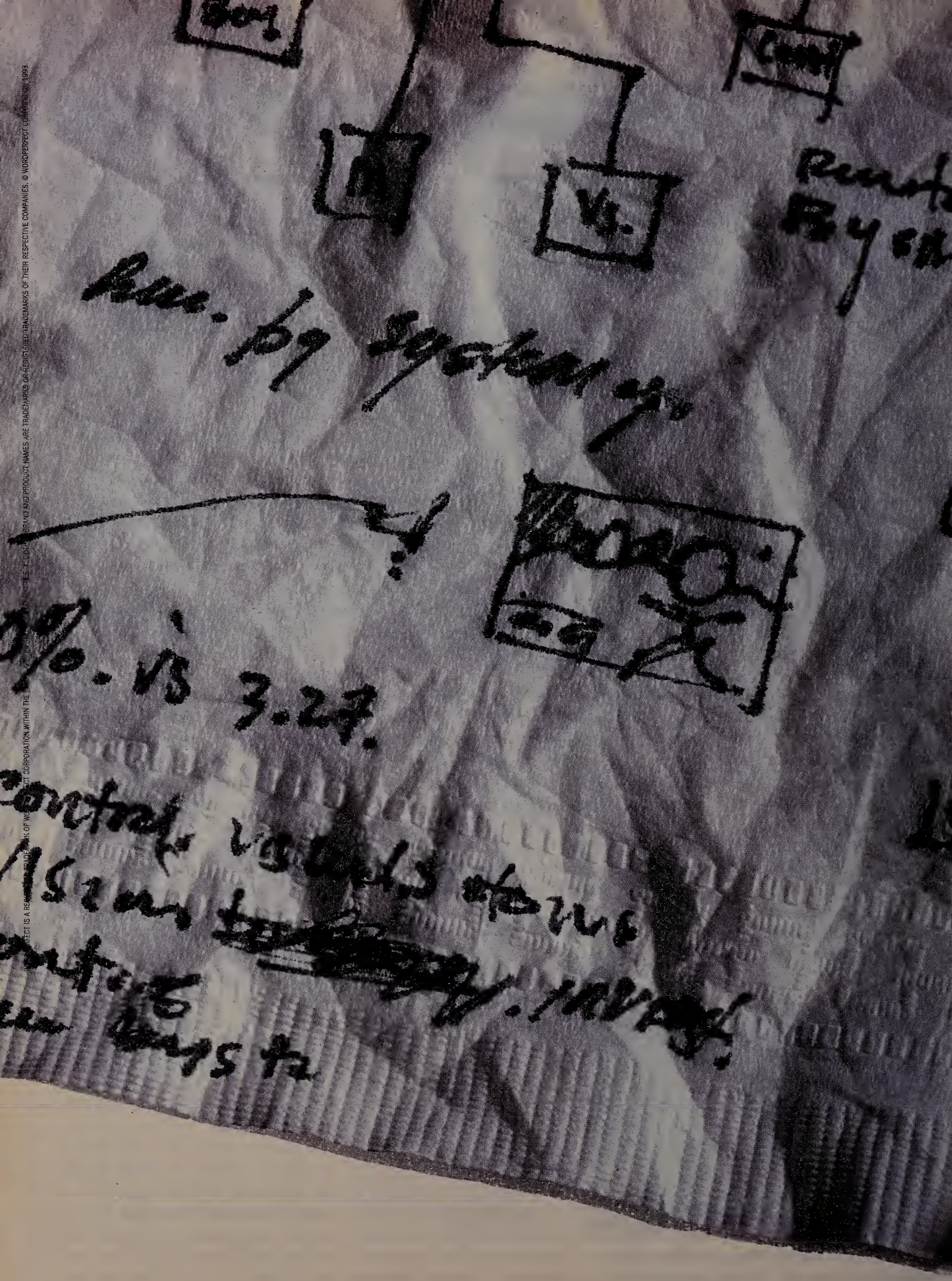

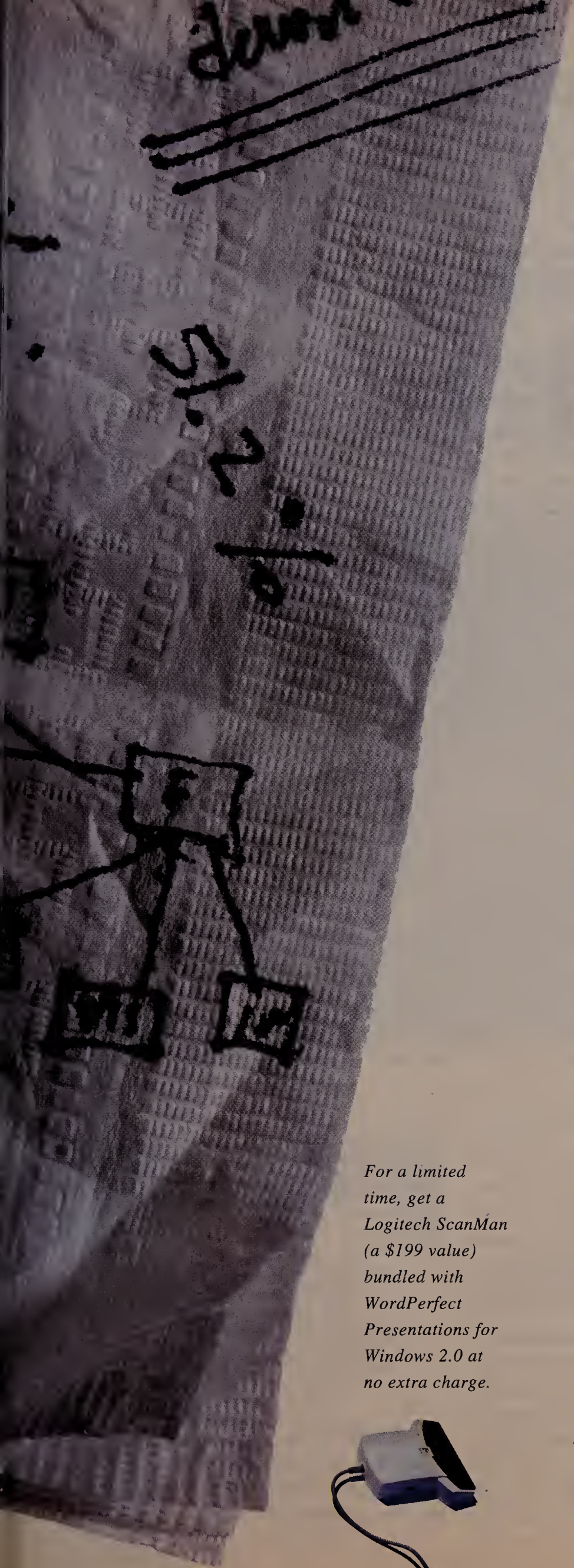

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you want to cut from. Press **<Alt>-<Space>** to shrink cc:Mail to a window and open the window's control menu. Select **E** to edit text and **K** or **<Enter>** to mark it, then select the text by holding down **<Shift>** and using the cursor keys or by dragging the mouse pointer. Press **<Enter>** to copy the text to the Clipboard. Switch to your word processor and paste in the text as you normally would (in WinWord, you can do this by pressing **<Shift>-<Insert>** or **<Ctrl>-V**.)

You can also use these tricks to cut and paste from a word processor into your E-mail package. If the text you paste into cc:Mail still loses its formatting, you can clean it up quickly: First, if there are any blank lines inside paragraphs, cursor to the first one and press **<Alt>-<F4>** to remove it. Repeat this step to remove any others. Then move the cursor to the beginning of the pasted text (use **<Ctrl>-<Home>** if the pasted text starts the message), hold down **<Alt>**, and press **<F8>** repeatedly until all your paragraphs are reformatted.

To return to a full-size cc:Mail screen, which runs faster than a windowed session, simply press <Alt>-<Enter>, even (or especially) during a paste.

Microsoft Mail

Quick Message Sorting

Want to sort your messages by sender or subject? You could use the View menu, but there's a faster way. In Microsoft Mail for Windows, select the *Inbox* folder, then click the *From* column header. The messages will display alphabetically by sender. You can also click the *Subject* header to display the messages alphabetically by topic, or the *Received* header to sort the messages by the latest date and time. To sort in reverse order, hold down the **<Ctrl>** key when you click a header.

Spotlighting Your Reply

If you routinely comment on messages you receive, help the recipient distinguish your remarks from the original by making a change to your MSMAIL.INI file. Toggle to Program or File Manager, select *File•Run*, and enter **MSMAIL.INI** to open that file in Notepad. In the section that begins [Microsoft Mail], enter **ReplyPrefix=~** on its own line, substituting any character or characters you choose for ~. Save the file and return to Microsoft Mail. When you're ready to reply to a message, select the file in your Inbox, click the *Reply* button, and you'll see that each line of the old message is preceded by ~ (or whatever characters you used). Enter your new message as usual.

Refine Your Searches

Looking for particular messages? Microsoft Mail for Windows lets you narrow your searches by entering criteria in more than one field. To find your messages from George Jones about sales, for example, select *File•Message Finder*, type **George Jones** in the From field and **sales** in the Message Text field, and click *Start*.

But what if you want to search for two names or subjects within the same field? It's simple but not obvious: Just use a semicolon. To find all messages from George Jones and Rita Paulson, type **George Jones; Rita Paulson** in the From field. Finally, if you want to search for messages from George and Rita about sales revenues, enter **George Jones; Rita Paulson** in the From field and **sales; revenues** in the Message Text field. You don't need to enter the full name or subject—the program will bring up any messages containing the search string you enter.

Create Message Templates

If you regularly send the same message, say, to schedule a meeting, save time by creating a preaddressed message template in Microsoft Mail for Windows. Choose *Mail•Compose Note* or press **<Ctrl>-N**, select the addressees, then type in the subject and the standard message. Double-click the message window's *Control* icon in the upper left corner or press **<Ctrl>-<F4>**. Answer *Yes* to the prompt to save the message. Whenever you want to send the message, drag and drop it into your Outbox window. The message opens automatically, allowing you to add any desired text. Click *Send*, and the message goes on its way. If you use a lot of templates, select *File•New Folder* to create a template folder to store them.

Quick Folder Tree Management

For better organization, Microsoft Mail for Windows lets you create folders within folders. To create a folder named Urgent within the Inbox folder, choose *File•New Folder*. In the New Folder dialog box, name the folder **Urgent** and click *Options*. Check *Subfolder Of*, click *Inbox*, then click *OK*. Microsoft Mail indicates that there is a subfolder by marking the Inbox folder with a plus sign (see **FIGURE 3**). You can click that plus sign (or highlight it and type **+**) to display its subfolder, or if the subfolders are displayed, click the parent folder's minus sign (or highlight it and type **–**) to hide them.

Force Compression of Your Mail Files

When you sign in to Microsoft Mail for Windows 3.0b or later, you can check the integrity of your mail files and compress them to save disk space. After typing your password, click *OK* and then hold down the **<Shift>** key. At the prompt, select *Check File* and the program will check the integrity of your MMF file, which contains all the messages in your Inbox, Outbox, private folders, and personal address book. The program also forces compression of your MMF file, freeing space on your hard disk. You can also hold down **<F5>** instead of <Shift> to do compression only.

Archiving Old Messages

Microsoft Mail for DOS makes it easy to archive entire folders. From the main menu, select *Options•Folders•Folders Archive*. At the prompt, use the cursor keys to select the folder to archive and press **<Enter>**. At the Filename prompt, enter the floppy or hard disk drive file you want to archive to. Microsoft Mail automatically copies the messages to that file.

Avoiding Your Mail

To save time in Microsoft Mail Remote, users can choose which messages they wish

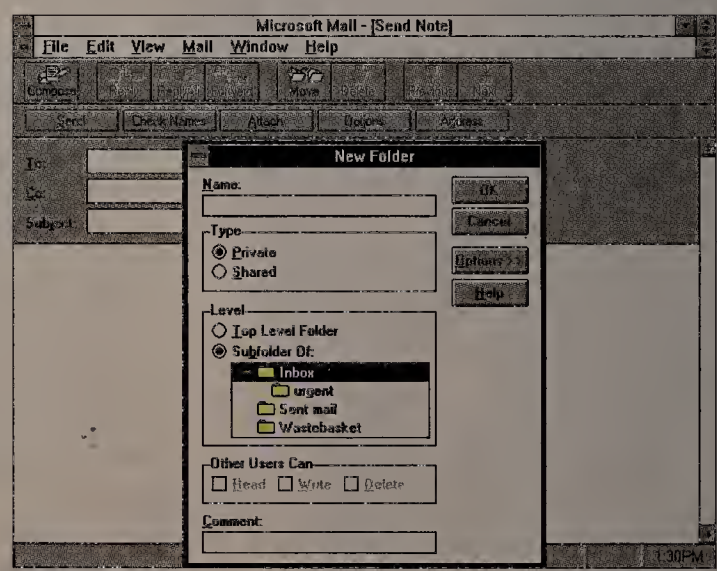

FIGURE 3: CREATE FOLDERS WITHIN FOLDERS in Microsoft Mail for better message management. As shown here, Urgent is a subfolder of Inbox.

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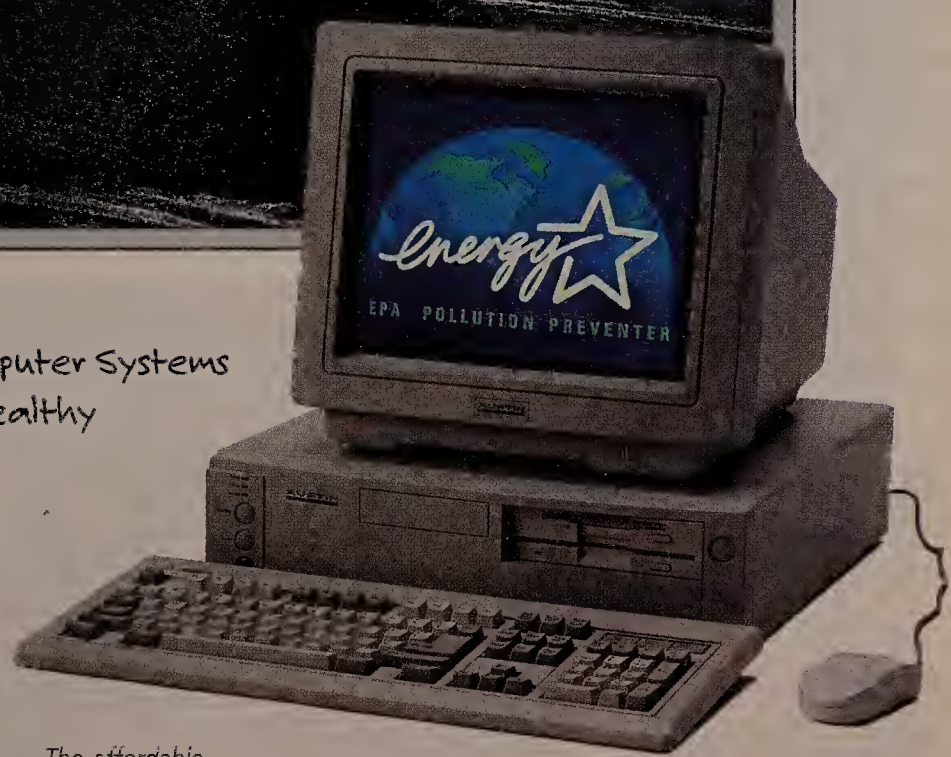

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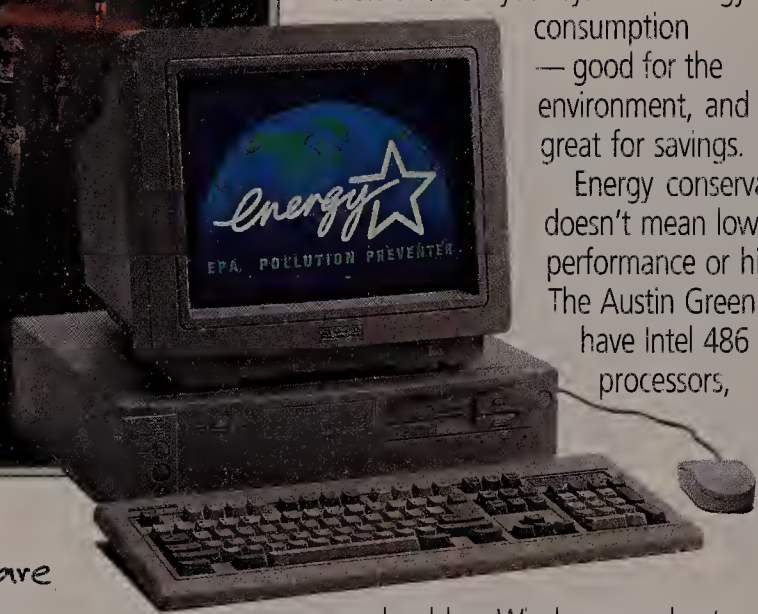

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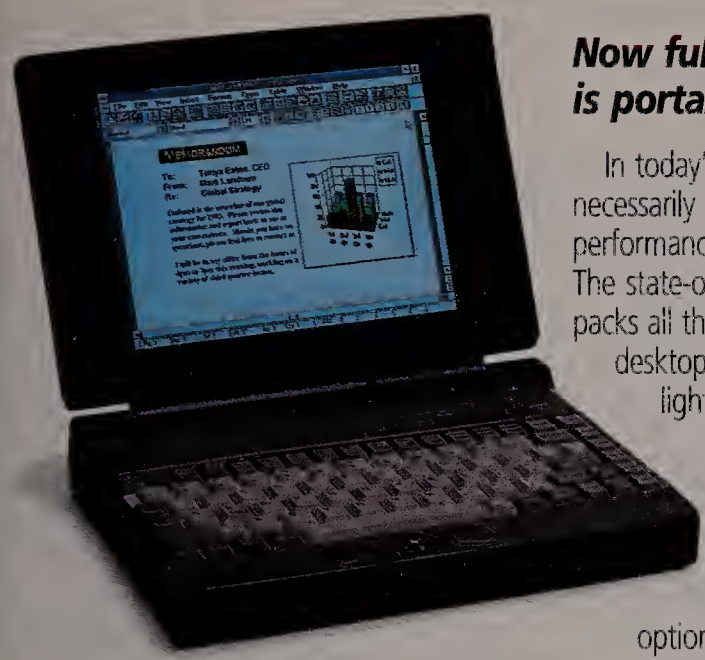

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to download. Choose *Mail•Session Setup*, select *Send All* and *Retrieve Selected Headers*, and click *OK*. Select *View•Headers* and click *Get Headers*. Microsoft Mail Remote lists the messages waiting in your post office box, including the sender's name, subject, date, and message size in bytes. Select the messages you want to retrieve, click *Retrieve*, choose *Connect Now*, and click *OK* to download your mail. The program delivers only the requested messages.

WordPerfect Office Mail

When You Need to Eat Your Words

Have you ever sent a message rashly and then thought better of it? Well, as long as the recipient hasn't read it yet, you can remove it from his or her mailbox without a trace. From the WordPerfect Mail for DOS screen, press **<Tab>** to get to the Out Box window (in Windows, press **<Tab>** and if it's an icon, **<Enter>**) and highlight the message you regret sending. Choose *2 Del* (in Windows, *Edit•Delete*); you can choose from two ways of retracting your message. Select *All In Boxes* to remove the message from all recipients' In Boxes while leaving it in your out-box (if you get in a bad mood later, you can resend it). Or select *All Mailboxes* to erase the message from both the recipients' In Boxes and your own Out Box. (In Windows, confirm the action by clicking *Delete*). *[Editor's note: Since these tips were written, WordPerfect released version 4.0 for both DOS and Windows; some steps may differ.]*

Recycling Messages

Tired of sending the same message over and over? "Don't forget the monthly staff meeting!" or "All timesheets are due by Friday"? Instead of retyping the message, press **<Tab>** to go to the Out Box on the WordPerfect Mail for DOS screen, highlight the message to be recycled, and choose *1 Read*. Then choose *7 Resend*. This brings the message into an ordinary Mail Message screen, where you can edit any part of the message or its header. When you're ready to send it again, press **<F9>** (Send) so a blank mail message screen displays. Press **<F7>** to exit and you'll return to the message you just resent. Press **<F7>** again to return to the WordPerfect Mail screen.

Managing Groups of Messages

Managing large volumes of messages in a box or folder is easy if you know WordPerfect Mail's secret—the asterisk (*). For each message you want to delete, print, save, or move into a folder, cursor to it and type *. To remove an asterisk, simply select the message and type * again. To mark or unmark all the messages in the box or folder at once, press **<Alt>-<F5>**; asterisks will appear next to each one.

Building an Audit Trail

If you're involved in an ongoing correspondence, it's useful to refer to previously sent messages. WordPerfect Mail doesn't let you add text to a message that someone else has sent, but you can use the Forward command to send back the original message as an attachment with your answer instead of just using the Reply command.

From the WordPerfect Mail main screen, highlight the message you want to answer and press **<Enter>**. Then, to include the original message with your answer, select *6 Forward* (in Windows, choose *Mail•Forward* or press **<Ctrl>-F**). In the To field, address your message right back to the original sender (note that his or her mailbox name is displayed in the Message box after the phrase 'Forwarded mail received from:'). Type in your message and press **<F9>** (in Windows, click *Send*) to send it.

When the recipient reads the message, it is displayed as usual. However, 'MESSAGE' appears repeatedly at the top of the screen, indicating that there is an additional message attached to the current one. The recipient can press **<Tab>** to view the original message or the answer. There is no limit to the number of times an envelope can be forwarded back and forth. The newest message appears first, with previous messages available by tabbing from newest to oldest. (Use **<Shift>-<Tab>** to move from oldest to newest.)

FIGURE 4: FILTER YOUR WORDPERFECT OFFICE for Windows Messages by entering a name, subject, priority level, or even a range of dates.

Create a Message File

While it's true that you can leave messages in your In Box until hell freezes over, it's often useful to save them to a single text file so you can edit and print them all at once. To create an ongoing message file, from the main mail screen, a folder, or the Read screen, mark the message(s) with an asterisk and choose *3 Save*. Answer *Yes* to the 'Save marked envelopes' prompt, then type the path and file name and press **<Enter>**. If no file exists with that name, your message will be stored in that file. If a file by that name already exists, you will be prompted to replace it or append to it.

View Selected Messages

WordPerfect Mail for Windows lets you view only messages that meet specific criteria. To define your selection criteria, open the In Box or Out Box that you want to filter (folders for both boxes will be included in the filter criteria). Then choose *View•Filtered Mail*. In the Filter Mailbox Messages dialog box, enter your filter criteria. For example, to show only high-priority messages from your boss that appeared during your vacation, type your boss's name in the Name field, click the *Priority* button and select *high* from the pop-up menu, and specify the dates by clicking the *Postmarked* button, selecting *Between* from the pop-up menu, and filling in the dates you require (see **FIGURE 4**).

Click *OK*, and your In Box or Out Box will display only those messages that match your filter criteria. To view all your messages again without filters, choose *View•Filtered Mail*, and click the *Reset* and *OK* buttons to return to the mailbox.

Anita Amirrezvani is a contributing editor for PC World. *WordPerfect consultant Ruth Halpern,* PC World *editors Steve Fox, Anita Hamilton, Karl Koessel, Robert Luhn, Shane Rau, Daniel Tynan, and Christina Wood, and the technical support departments of cc:Mail, Microsoft, and WordPerfect contributed to this article.*

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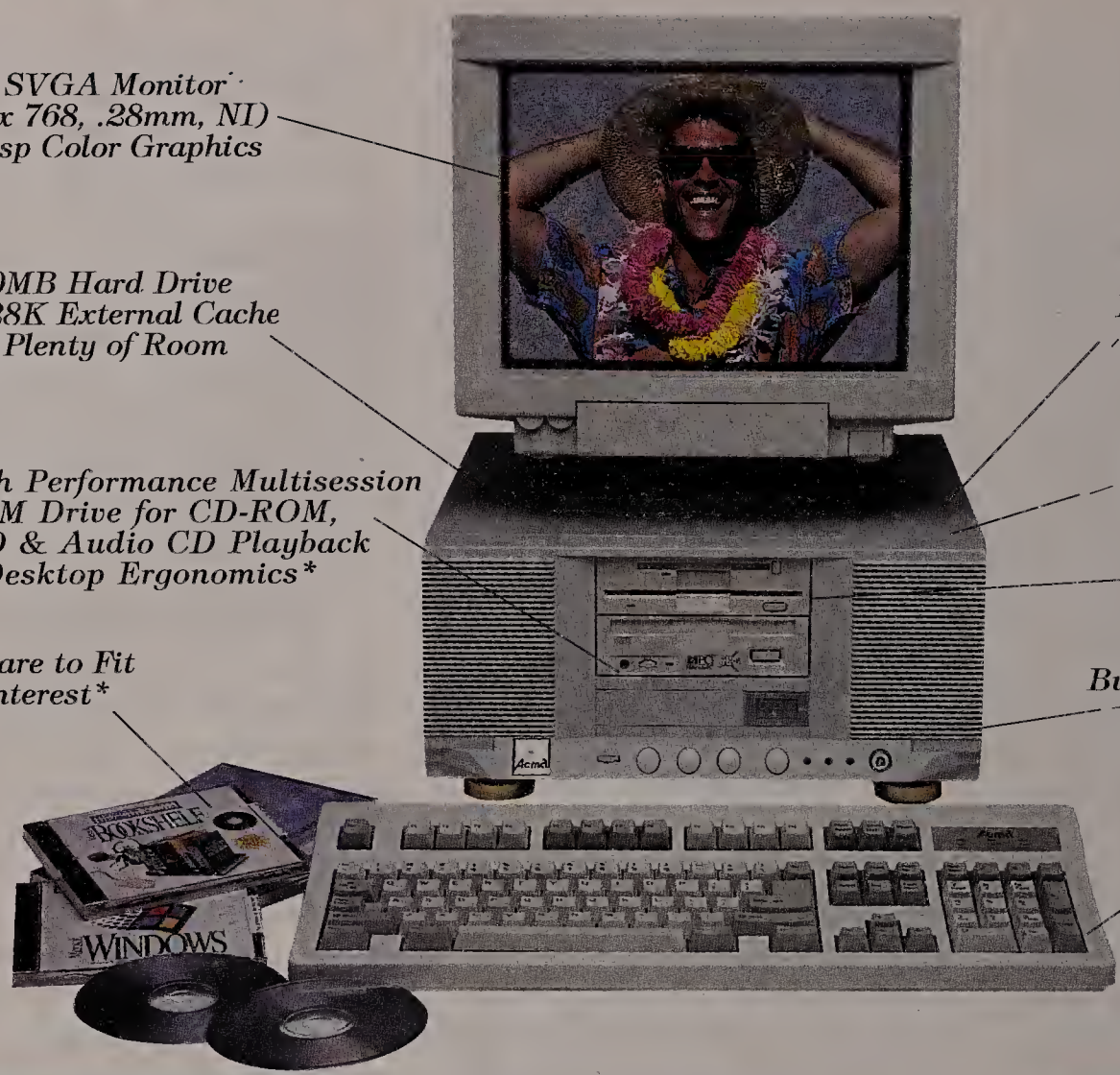

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Here's How

Contents: Spreadsheets 304 | Word Processing 312 | Windows 318 |

HELP LINE Q & A

Tip of the Month

DON'T LEAVE YOUR FAVORITE APP: If you spend most of your time in one Windows application, such as Word for Windows, you can launch apps and even open files without toggling to Program Manager. In WinWord, select Tools • Record Macro, type FileManager in the Record Macro Name box, select F from the Key drop-down list, and type Launch Windows File Manager in the Description text box. Click OK. Select Tools • Stop Recording and Tools • Macro. Click or cursor to FileManager in the Macro Name list box and click the Edit button. Press <End><Enter> to insert a new line after 'Sub MAIN', and type Shell "C:\WINDOWS\WINFILE.EXE", 1. Select File • Save All, answer Yes to the dialog boxes, and select File • Close. Press <Ctrl>-<Shift>-F, and you'll launch File Manager just as if you'd double-clicked its Program Manager icon. When you exit File Manager, you'll return to WinWord.

You can create a macro to open each of your favorite programs or files by using WinWord's SHELL macro command followed by the file's path and file name in quotes, a comma, and the number 1. You can even assign your macros to tool bar icons to make them easier to launch.

Philip Boutros, Chicago

Baffling Beep

Q I'd like to know why the computer beeps when I turn it on.
Caitlin Bowden, Marietta, Georgia

A To tell you it's healthy. The original PC used a series of long and short beeps to say what was wrong even if the screen wasn't working. This feature remains in many compatible computers. If you hear a single beep when you turn on your computer, it means all is well.

Floppy Fix

Q I built my 486 PC and wanted both a 5¼-inch and a 3½-inch floppy drive. When I turned on the PC after installing the drives, the LEDs on both turned on and stayed lit, but I couldn't access either drive. When I connected only one drive, it worked perfectly. Can you offer some troubleshooting advice?
Gary L. Philips, Blytheville, Arizona

A The most common causes of floppy disk problems in newly assembled systems are improperly set jumpers and terminators. If your drives are attached to a "straight through" cable—that is, one in which all the wires run from end to end without twists or breaks—make sure that the drives' jumpers are set so that one is drive one and the other is drive two. If there's a twist in the cable, jumper them both as drive one; the twist will give them different letters.

Then make sure that the drive on the end of the cable has a terminator installed and that the one in the middle does not. Terminators are usually easy to identify because they're close to the rear edge of the circuit board, and they're usually the only devices on the entire board that are socketed instead of soldered on. They're usually black or orange and have one or two rows of pins. If you're not sure where the terminator is or how to add or remove it, contact your dealer or the drive's manufacturer.

Practice Programming in Pascal

Q I want to learn to program for DOS and Windows. What's the best way to learn? Can I just buy a compiler, such as Microsoft's Visual C++, and learn from the documentation?
S. L. Fine, Columbia, Maryland

A Unfortunately, the documentation supplied with most C++ compilers is designed for experts—as is the C++ language itself. My advice: Start with a community college course in programming and a simpler, more ergonomic and consistent language, such as Pascal. Borland's new Pascal 7.0, which produces programs for both DOS and Windows, might be a good place to start.

Muted Modem

Q I find it difficult to hear my modem dialing, which lets me know it's working. How do I increase the volume of my internal modem's speaker?
Peter J. Sopliwenko, Brockton, Massachusetts

A If your modem uses the Hayes command set (virtually all do), you can increase the volume by adding **L3** to your communication software's modem initialization string immediately after the letters 'AT'. The ATL3 command turns the volume all the way up—which may be too loud or distorted for your taste. If so, try ATL2. To turn off the speaker, you can type ATL0.

SCSI Snafu

Q I have several questions about SCSI and SCSI host adapters. I have heard that the VESA local bus has a significantly faster maximum transfer rate than the EISA bus. Yet many of the "ultimate" PCs and servers featured in *PC World* reviews use EISA SCSI adapters. Why? What's the difference between SCSI-2, Wide SCSI-2, and Fast SCSI-2? When will SCSI-3 hit the marketplace?
Roy Foliente, Colton, California

A Many manufacturers use EISA SCSI host adapters instead of VLB cards for good reason: EISA is a more mature technology, while VLB is relatively new and still bedeviled by minor incompatibility problems. There's no speed penalty for using this slightly slower interface, because EISA's maximum data transfer rate (33MB per second) is greater than the rate at which the fastest SCSI disk drives can deliver data.

SCSI-2, the latest finished version of the SCSI standard, is the one to which virtually all new products conform. A plain vanilla SCSI-2 device is allowed to transfer data at a maximum rate of 5MB per second. However, SCSI-2 allows devices to speed up traffic on SCSI's "data highway" in two ways: transferring data more quickly (Fast SCSI can deliver 10MB per second) and/or widening the data path from 8 bits to 16 or 32 bits. Wide SCSI drives are uncommon now, but they may become more common on network servers within the next few years.

SCSI-3, the next version of the standard, is still far from completion, and many of the features it describes may not catch on. Don't wait for this version before buying a SCSI peripheral; today's SCSI-2 devices are more than adequate for any PC.

QEMM Quirk

Q I have an ISA 486DX-33 system with 32MB of RAM and am running version 6.02 of the QEMM386 memory manager. In DOS, I have access to the full 32MB, but in Windows, only 8MB is available. Why?
David Fioramonti, Arlington, Virginia

A Quarterdeck Office Systems, the maker of QEMM386, has received hundreds—perhaps thousands—of calls about this quirk (which version 7 eliminates). In an effort to retain maximum compatibility with Windows 3.0, QEMM386 limits extended memory to the lower 16MB of RAM. (You can still use all available RAM as expanded, or EMS, memory, but Windows programs won't be able to use it.) You are probably finding only 8MB available because you've used some of the first 16MB of RAM for TSRs, a disk cache, or a RAM drive.

Since Windows 3.1 is more tolerant of machines with up to 256MB of RAM, you can make all your free RAM available to it by specifying the option EMBMEM=31744 on the DEVICE=QEMM386 line of CONFIG.SYS.

Pondering Page Mode

Q The documentation for my motherboard says that it requires 80ns DRAM chips to support "fast page mode." My local computer dealer cannot explain what this is. Can you?
Bill Krause, Jacksonville, Florida

A Fast page mode is a special way of accessing a memory chip. It allows your computer's motherboard to read from and write to RAM several times faster than usual—as long as it is reading and writing locations in the same general area of memory (called a *page*). Most PCs—especially those with cache memory—take advantage of this mode to speed up memory access.

In general, when you buy memory for a late-model PC, you don't need to ask about fast page mode; most standard SIMMs have it.

Losing Time

Q My Micronics 486-33 motherboard has recently started to lose time on the system clock—up to 5 hours a day!

USER GROUP OF THE MONTH

Twin Cities PC Users Group

The November user group tips come from the Twin Cities PC Users Group. Members receive a 44-page monthly newsletter with the User Group Helpline listing of volunteers offering hardware and software support. TC/PCUG members also have access to a BBS with a shareware library of about 2 gigabytes (14,000 programs). TC/PCUG supports 28 special interest groups, including Excel, R:BASE, C++, Access, Ami Pro, Windows, OS/2, Your First PC, Visual Basic, and Networks.

For more information, contact Bill Rothermal at Edina Community Center, 5701 Normandale Rd., Edina, MN 55424, or call 612/929-5850 for a recorded message. TC/PCUG BBS is available by calling 612/888-0468. TC/PCUG meets on the second Tuesday of every month and invites the public to attend. Yearly membership is $30.

Reader service no. 641

EASY SEQUENTIAL EDIT: Since CONFIG.SYS and AUTOEXEC.BAT are so often changed one right after the other, it's useful to have a simple way to edit in sequence. This two-line batch file, CFG.BAT, launches DOS's EDIT and opens CONFIG.SYS. When you exit the program, it then relaunches EDIT and opens AUTOEXEC.BAT. To use it from any directory, make sure that CFG.BAT, EDIT.COM, and QBASIC.EXE are in a PATHed directory.

```
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EDIT C:\AUTOEXEC.BAT
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Curt Trout,
Twin Cities PC Users Group

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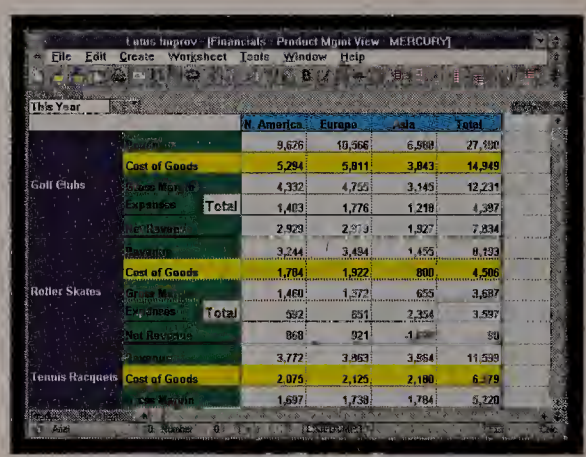

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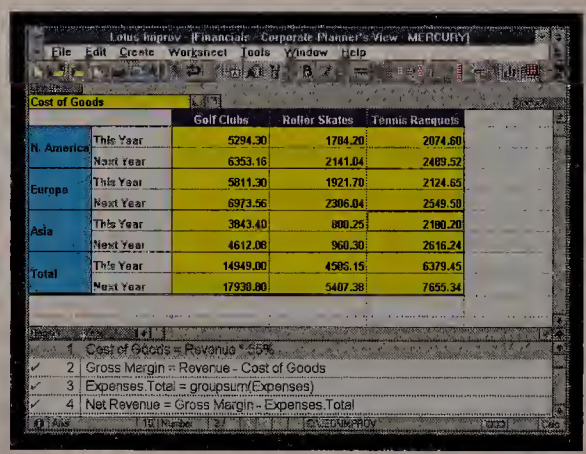

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Anyone who bought Improv Release 2.0 can get the network ready edition of Improv Release 2.1. WK4 support and the Application Field Exchange features free in an update kit. C+E Extend will not be available as Improv for NeXT. CA Compete and Symphony.* ***In Canada call **1-800-GO-LOTUS**. ©1993 Lotus Development Corporation, 55 Cambridge Parkway, Cambridge, MA 02142. All rights reserved. Lotus, 1-2-3, L of Microsoft Corporation. Quattro is a registe

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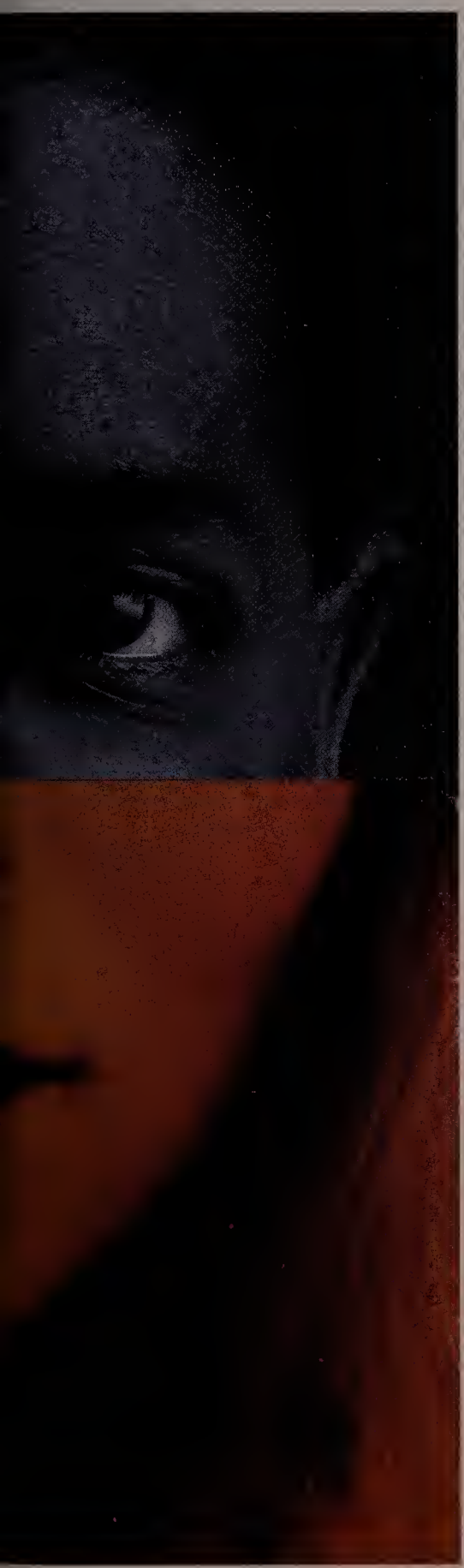
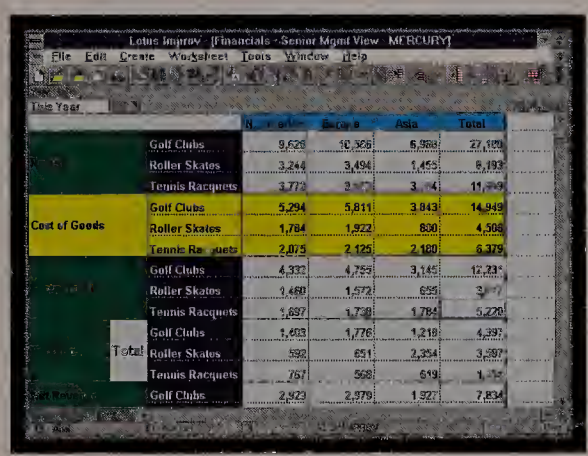


participation and give his people more confidence in their numbers. With Improv there are no cryptic formulas. Everything is spelled out in a way that makes sense. And there's no longer the fear of forgetting to update that one cell.



Drag and drop again for yet another view. You can save different views for future reference.

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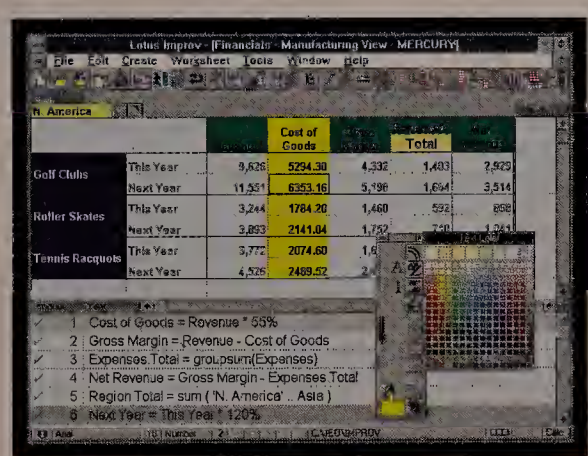

Another drag of the mouse to view the data by year. And because the formulas are right there, in plain English, it's easy to follow.

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I replaced the batteries with new rechargeables, but the problem still occurs. Any suggestions?
Deane F. Whitney, Athens, Georgia

A Every PC-compatible system with a 286 or later microprocessor actually has two clocks: the CMOS real-time clock chip, which keeps time even when the machine is turned off, and the BIOS clock. The BIOS clock is simply a location in memory that's set from the real-time clock when your PC boots and is then updated each time a "clock tick" interrupt occurs—about 18.2 times per second. The BIOS clock supplies the time reported by DOS's TIME command. But when you use the TIME command to change the system time, it sets both clocks to the time you've entered.

If your PC's clock is losing time, here's how to determine what's wrong. First, run the machine continuously for several days. If it doesn't lose any time but does lose time when you turn it off and on again, the problem is that the CMOS clock is running slow. This may be due to a poorly calibrated crystal, a failing clock chip, or a weak battery. If you're using rechargeable nickel cadmium batteries that aren't specially designed to power a computer's clock, they're probably the source of the problem. NiCd batteries have a substantially lower voltage than alkaline or lithium cells, and because the computer will not recharge them, the voltage will soon drop even lower. If you're using the right kind of battery, take the machine to the shop; it may need a new CMOS clock chip or crystal.

If the machine loses time when it's turned on for a long period but catches up when you reboot, the BIOS clock is running slow. In this case, there are three possible culprits. The first is resident software that steals timer ticks away from the BIOS. To see if this is the problem, do a "clean" boot—that is, with no drivers or TSRs installed. (The easiest way to do this is to boot from a floppy disk formatted with the FORMAT /S command.) If the clock keeps better time, reinstall the software programs one at a time until you identify the one that's throwing the clock off. But if the clock runs slow even after a clean boot, the problem is either the PC's counter/timer chip (also responsible for creating speaker sound) or the crystal connected to it. These parts require soldering to fix, so have a technician look at the board.

Finally, a third source of time loss is fairly common on DOS PCs. Sometimes when users leave their machines on all night, they return the next day to discover that the time is correct but the date is one day behind. This problem, called the "midnight bug," is usually caused by poorly written software that interferes with the BIOS clock. A TSR program to fix this problem was submitted by Irwin Cohen of Brooklyn (see *Star-Dot-Star*, September 1991). To create the program, first save the DEBUG commands in **FIGURE 1** in an ASCII text file called FIXDATE.DAT. Double-check your typing—it's easy to make mistakes. Then go to the DOS prompt, make sure that you're in the same directory as FIXDATE.DAT, and enter the command **DEBUG < FIXDATE.DAT**. That command will cause DEBUG to create FIXDATE.COM. Put FIXDATE.COM in the root directory of your boot disk (A: or C:) and add the command **FIXDATE** to the end of your AUTOEXEC.BAT file to make sure that your PC's calendar stays up-to-date.

```
N fixdate.com
E100 E9 C1 01
F103 214 0
E215 50 1E 52 51 2E A1 0F 01 3D 00 00
E220 75 49 2E C7 06 0F 01 01 00 B8 40 00 8E D8 80 3E
E230 70 00 00 74 2F 57 06 2E C4 3E 08 01 26 80 3D 00
E240 07 5F 75 20 2E 8C 16 11 01 2E 89 26 13 01 8C C8
E250 8E D0 8D 26 15 02 B4 2A CD 21 2E 8E 16 11 01 2E
E260 8B 26 13 01 2E C7 06 0F 01 00 00 59 5A 1F 58 2E
E270 FF 2E 03 01 50 1E 52 51 2E A1 0F 01 3D 00 00 75
E280 3A 2E C7 06 0F 01 01 00 88 40 00 8E D8 80 3E 70
E290 00 00 74 20 2E 8C 16 11 01 2E 89 26 13 01 8C C8
E2A0 8E D0 8D 26 15 02 B4 2A CD 21 2E 8E 16 11 01 2E
E280 8B 26 13 01 2E C7 06 0F 01 00 00 59 5A 1F 58 2E
E2C0 FF 2E 07 01 0E 1F 8D 16 14 03 B4 09 CD 21 B4 34
E2D0 CD 21 2E 89 1E 0B 01 2E 8C 06 0D 01 B8 1C 35 CD
E2E0 21 2E 89 1E 03 01 2E 8C 06 05 01 BA 15 02 0E 1F
E2F0 88 1C 25 CD 21 B8 28 35 CD 21 2E 89 1E 07 01 2E
E300 8C 06 09 01 BA 74 02 0E 1F 88 28 25 CD 21 8D 16
E310 C4 02 CD 27 46 69 78 64 61 74 65 20 34 2E 31 2C
E320 20 28 43 29 20 31 39 39 31 20 49 2E 20 43 6F 68
E330 65 6E 0A 0D 24
RCX
235
W
Q
```

FIGURE 1: DOES YOUR PC LOSE TRACK OF THE DATE? Use DEBUG to create a TSR that makes DOS aware that midnight has passed.

Fast Floppy Copy

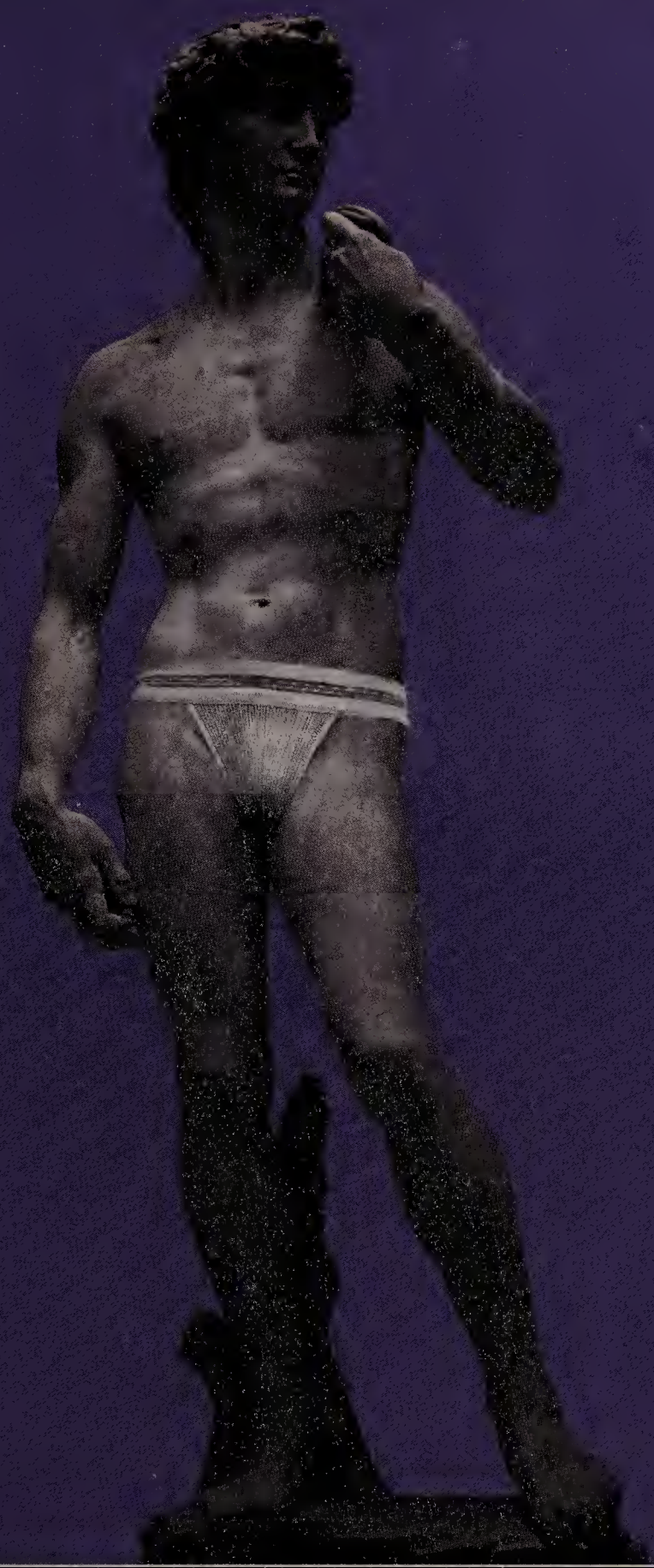
Q I have a 486-33 system with one 5¼-inch and one 3½-inch floppy drive. Is there any way I can use DISKCOPY without swapping the source and target disks several times? Or is there another program that can do the job in one pass?
Colonel Brian J. McKenna, U.S. Army

A Of all the programs that can do the job, the most common by far is Windows' File Manager. The Disk•Copy Disk command will copy a disk in one pass, no questions asked. If you prefer to copy your disks in DOS, there are many free and shareware utilities to choose from. Some in America Online's software library include Polycopy, by Joseph M. Albanese; Diskdupe, published by Micro System Designs; Suprdupr, by Mike Gallion; Copycat, by Ralph E. Dodd; Bigcopy, by Lawrence Edward Widacki; and DCF (Disk Copy Fast), by Chang Ping Lee.

Another option is Novell's DR DOS DISKCOPY, which can copy disks in one pass and can also make multiple copies without requiring that you reinsert the source disk.

By Brett Glass

Brett Glass is a contributing editor for PC World. Help Line *welcomes your questions. See page 10 for contact information.*



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SPREADSHEETS Q & A

Graphing the Current Record in Excel

Q I'm using Excel 4.0 to track donations. I've managed to import data from our database and create a database worksheet, and now I'd like to create a line graph that will appear next to the data to display donations from the current record. Do I have to define a chart for each record?

Neil Carlson, Walnut, California

A Thanks for asking a question that lets me show off one of Reed Jacobson's coolest tricks (Reed is an Excel consultant based in Arlington, Washington, and the author of *Excel Trade Secrets,* published by Que). In this case, the secrets are a relative range name that refers to the row where the active cell indicator is located and a date formula that recalculates whenever you press <F9>. Using these techniques lets you define a single chart that recalculates for each record you select.

Say you've set up the database in **FIGURE 1**. (To do it, enter the labels and values in A1:E9.) In cell A11, enter **=TODAY()**. Save the worksheet as **LIVEGRAF.XLS**.

Then define the range names shown in the table at C11:D13. Put the active cell indicator on row 2, and select *Formula•Define Name;* in the Name box type **Current**, in the Refers to box type **=$C2:$E2**, then click *Add*. Repeat the process for the other names, then click *Close* to return to the sheet.

Reproduce the dollar signs in the name referents exactly as shown. Normally, Excel range names have absolute references, with dollar signs before each row and column reference; such names always refer to the same cells, no matter where the active cell indicator is located. By omitting dollar signs in the row references for the Current and Name ranges, you create names that are relative to the position of the active cell indicator.

Now use the chart wizard to set up an empty graph. Select any blank cell, such as A13. Click the chart wizard tool, drag to position the chart object, click the *Next* button, select the line graph, then click the fast-forward button to skip the remaining steps. Double-click on the blank chart to edit it. Select *Chart•Edit Series*. In the Name box, enter **=LIVEGRAF.XLS!Name**; in the X Labels box, **=LIVEGRAF.XLS!Months**; in the Y Values box, **=LIVEGRAF.XLS!Current**. Click *OK*. Now click the legend, and press **<Delete>** to remove it. To add a title, select *Chart•Attach Text*, select the *Chart Title* radio button, and click *OK*. Type your title on the formula bar and press **<Enter>**.

Now for the secret ingredient. Click the formula bar at the top of the chart window, type **=LIVEGRAF.XLS!A11**, and press **<Enter>**. The current date appears in the middle of your chart; drag it to the upper left corner beside the chart title. Right-click the date and pick *Font*. In the dialog box, set Color to *White;* in the Background box, click the *Transparent* radio button. Click *OK*, and the date text becomes invisible. Select *File•Close* to return to the sheet.

The trick is putting the date formula in the chart. Since the chart refers to that formula, it will recalculate every time you press <F9>. To test this, put the active cell indicator anywhere on rows 2 through 9, and press **<F9>** to recalculate.

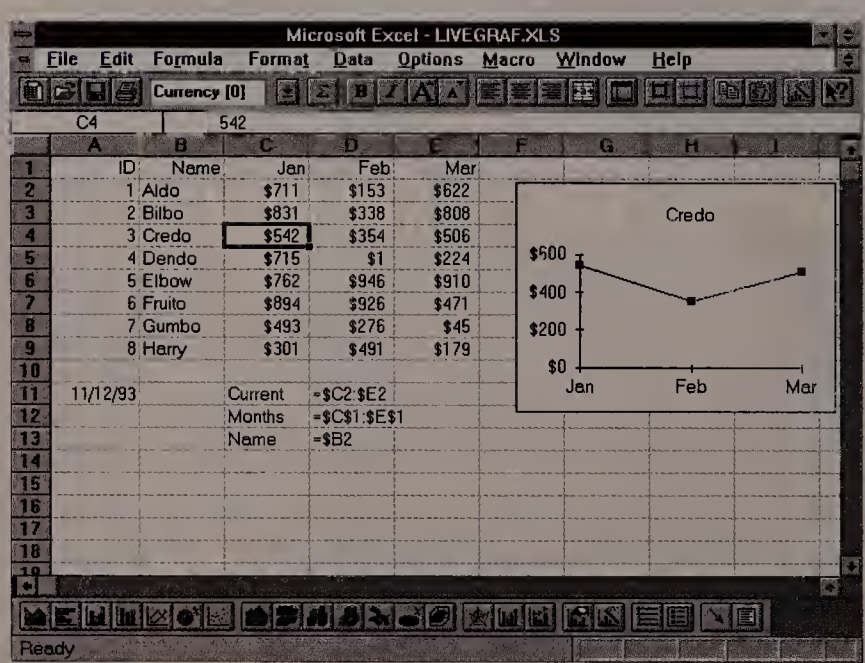

FIGURE 1: USE RELATIVE RANGE NAMES AND A DATE FORMULA to generate a different chart for each database record.

USER GROUP TIP

Excel Keyboard Shortcut

In Excel, I frequently check cells that are referenced by a formula. While Formula • Select Special • Precedents will highlight a selected cell's formula's predecessor(s), it's faster to double-click the cell or select it and press <Ctrl>-[. To travel among the highlighted cells, press <Tab>. Press <Ctrl>-] to select cells with formulas that reference a selected cell.

David Stavert, Twin Cities PC Users Group

Okay, Mister, Drop Those Labels!

Q In 1-2-3, I can create a bar chart that shows both positive and negative values, with the *x*-axis crossing at zero, midway on the *y*-axis. The negative bars appear below the chart, and the *x*-axis labels appear on the bottom of the chart. But in Excel, the labels appear right next to the *x*-axis and the negative bars fall on top of them. Can you help?

Jeff Yingling, Lancaster, Pennsylvania

A Sure. Double-click on the graph to enter the chart window. Right-click on the *x*-axis, and choose *Patterns* from the pop-up menu. In the Tick Labels box, click the *Low* button, then select *OK*. The labels will appear at the bottom of your graph.

Quick Counting With Quattro or Excel

Q I use Quattro Pro/W to display the rotation schedules at the urology clinic at our hospital. Residents might spend the first quarter in a gynecology

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	A	B	C	D	E	F	G	H	I	J	K
1		Qtr 1	Qtr 2	Qtr 3	Qtr 4			Qtr 1	Qtr 2	Qtr 3	Qtr 4
2	Thorin	CRA	GYN	R/E	OR			CC	CC	CC	CC
3	Dwalin	PED	GYN	OR	R/E			Qtr 1	Qtr 2	Qtr 3	Qtr 4
4	Bifur	CC	OR	R/E	GYN			CRA	CRA	CRA	CRA
5	Bombur	CRA	GYN	CC	CRA			Qtr 1	Qtr 2	Qtr 3	Qtr 4
6	Fili	GYN	R/E	PED	CC			GYN	GYN	GYN	GYN
7	Kili	R/E	CRA	OR	R/E			Qtr 1	Qtr 2	Qtr 3	Qtr 4
8	Baggins	OR	GYN	CC	PED			OR	OR	OR	OR
9								Qtr 1	Qtr 2	Qtr 3	Qtr 4
10								R/E	R/E	R/E	R/E
11	CC	1	0	2	1			Qtr 1	Qtr 2	Qtr 3	Qtr 4
12	CRA	2	1	0	1						
13	GYN	1	4	0	1						
14	OR	1	1	2	1						
15	PED	1	0	1	1						
16	R/E	1	1	2	2						

FIGURE 2: TRADITIONALLY, EXTRACTING DATABASE COUNTS requires numerous formulas with slightly different criteria, as shown here. Quattro Pro 5.0 for Windows lets you use a single array formula instead.

rotation, the second in critical care, and so on. I need my worksheet to show the number of residents in each rotation for each quarter. What's the best way?
Scott Swanson, Scottsdale, Arizona

A It depends on whether you've upgraded from release 1.0 to release 5.0, the newest version of Quattro Pro for Windows. (Don't panic, you haven't missed anything—the folks at Borland saw fit to skip releases 2, 3, and 4.) First, I'll show you the old database function method, which works in almost all spreadsheet programs, then I'll show you the new, more efficient way, which uses array formulas and works in Quattro Pro 5.0 for Windows and in Excel.

The traditional solution, shown in **FIGURE 2**, uses the database function @DCOUNT(). To set it up, enter the labels shown in A1..E8, A11..A16, and H1..K11. Then, in cell B11, enter the formula **@DCOUNT(B$1..B$8,0,H1..H2)**. This formula counts the number of entries in Qtr 1 (B2..B8) that match the criteria in H1..H2 (that is, where 'CC' is under 'Qtr 1'). Now, every formula in B11..B16 must be slightly different: The one in B12 is @DCOUNT(B$1..B$8, 0,H3..H4), because its criterion is different; the one in C11 is @DCOUNT(C$1..C$8,0,I1..I2), because it must calculate values for Qtr 2, and so on.

Array formulas provide a better solution to this problem because they require no criteria ranges and use only copies of a single formula. Quattro Pro 5.0 for Windows incorporates its own version of the array feature that has long been a hallmark of Excel. To try it, set up the worksheet in the same way, but omit the entries in H1..K11 and the formulas in B11..E16. In cell B11, enter **@SUM($A11=B$2..B$8)**, and copy it into range B11..E16. This strange-looking

Spreadsheet Toolbox

If you use your spreadsheet program to analyze technical data, you've probably been frustrated by the limited range of graph types available. Even Quattro Pro occasionally comes up short when your analytical needs stray far from typical business applications. Scientists, statisticians, engineers, and analysts can extend the reach of their spreadsheet charts with DeltaGraph Professional for Windows, a $495 stand-alone program from DeltaPoint.

In addition to offering the usual pie, bar, and line charts, DeltaGraph includes step charts, many variations of scatter plots, bubble charts, contour plots, spider charts, polar coordinates, and exotic 3-D specimens such as wire frames and 3-D scatter plots. Error bars are not a problem, and a variety of least-squares curve-fitting options are available. You can even supply your own functions to use for fitting curves. A drawing palette, clip-art library, gradient fills, and other decorative devices let you make your graphs flashy.

Anyone familiar with a Windows program can use DeltaGraph immediately. You begin a chart in a spreadsheetlike window, into which you can import or DDE-link data from your spreadsheet, insert and delete rows and columns, rotate the data, and so on. Then you choose a chart type and plot your graph, which appears in a drawing window. At this point, you can choose options, decorate the chart, then print it from DeltaGraph or OLE-embed it back into your spreadsheet.

DeltaGraph Professional for Windows 2.03, $495; DeltaPoint, 800/446-6955, 408/648-4000.

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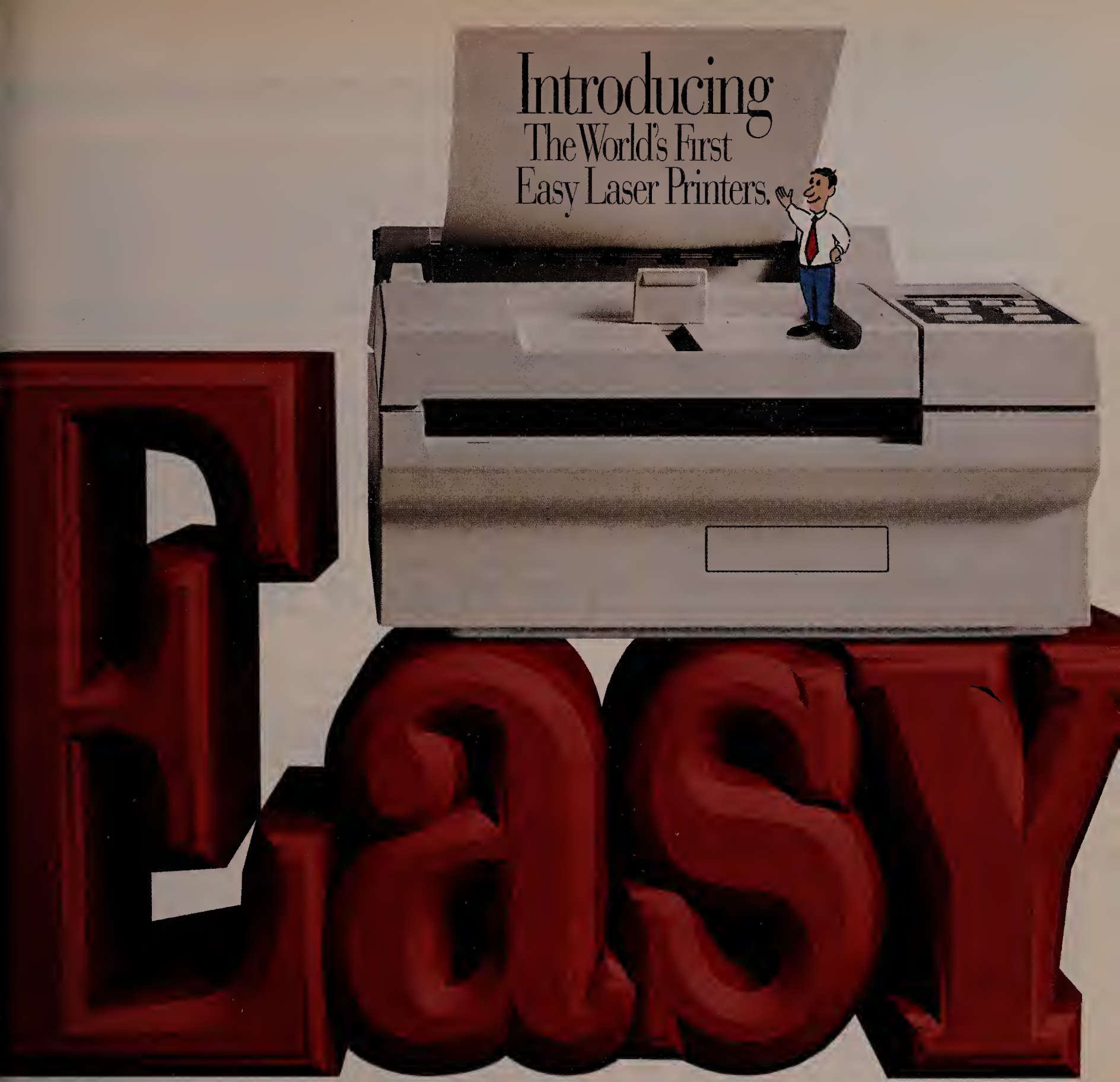

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formula is actually many formulas in one: It compares the label in A11 with every entry in the range B2..B8; each time there's a match, the array generates the value 1. The @SUM() function adds up the 1's and yields the count of CC rotations in Qtr 1. The dollar signs ensure that each copy of the formula refers to the proper ranges.

To enter the corresponding formula in Excel, type **=SUM(($A11=B$2:B$8)*1)** in cell B11, then press **<Ctrl>-<Shift>-<Enter>** to enter the formula as an array. The multiplication by 1 is required to convert Excel's logical values into numbers before summing them. Then copy the formula to B11:E16.

May at the Races, Revisited

Several readers wrote to question my solution to James Woodfield's dilemma ("Quick Number Conversions," May *Spreadsheets*). As you may reeall, he was keypunching times from *The Daily Racing Form* into Quattro in minutes, seconds, and fifths of a second. I suggested he enter the data as labels, then use a formula to convert the times to decimal seconds. "But why not just enter the minutes into column A, the seconds into column B, and the fifths into column C?" many of you asked. "Then you could just combine them with the formula +A1*60+B1+C1/5." True enough, dear readers, but if one has hundreds of times to enter, it's a lot easier to put the entries all in one cell than to punch data into three columns.

	A	B	C	D	E
1	V>SV>SV				Seconds
2	04.30.2	4	30	2	270.4
3	05.12.0	5	12	0	312
4	11.55.3	11	55	3	715.6

FIGURE 3: NEED TO PUNCH DELIMITED DATA into a spreadsheet? Here's a way to parse data into individual columns.

At any rate, my formula was a doozy, so Roger Charlesworth, of Kittery Point, Maine, offered an elegant solution that uses the Parse command as a general strategy for keypunching any kind of delimited data into a spreadsheet (**FIGURE 3**). First, select column A and use *Database•Data Entry•Labels Only* to force all entries in the column to be labels. In A1, enter the format line to be used for the parse: **|V>SV>SV**. (The format line determines how the parse command will divide the labels: V denotes the beginning of a value, > continues that value, and S skips a character—in this case, the periods.) Now use the numeric keypad to enter the times starting in A2 as shown, with leading zeros for the minutes and seconds, and with a period (or any other character) as the delimiter. When you're finished, select *Tools•Parse•Input* and select A1..A4. Choose *Output* and select B2. Then select *Go*. To compute the seconds in column E, enter **B3*60+C3+D3/5** into E2 and copy the formula to E2..E4.

By Richard Scoville

Richard Scoville is a software training consultant based in Chapel Hill, North Carolina. Spreadsheets *welcomes your questions. See page 10 for contact information.* ■

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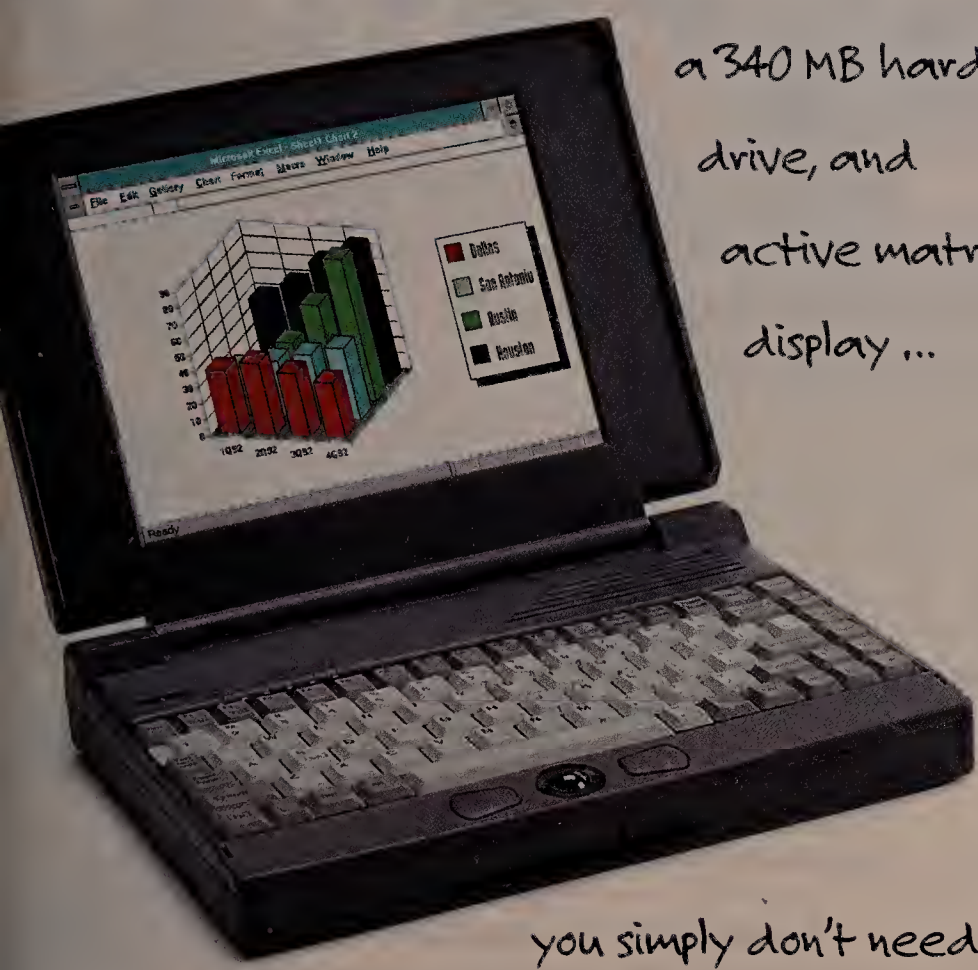

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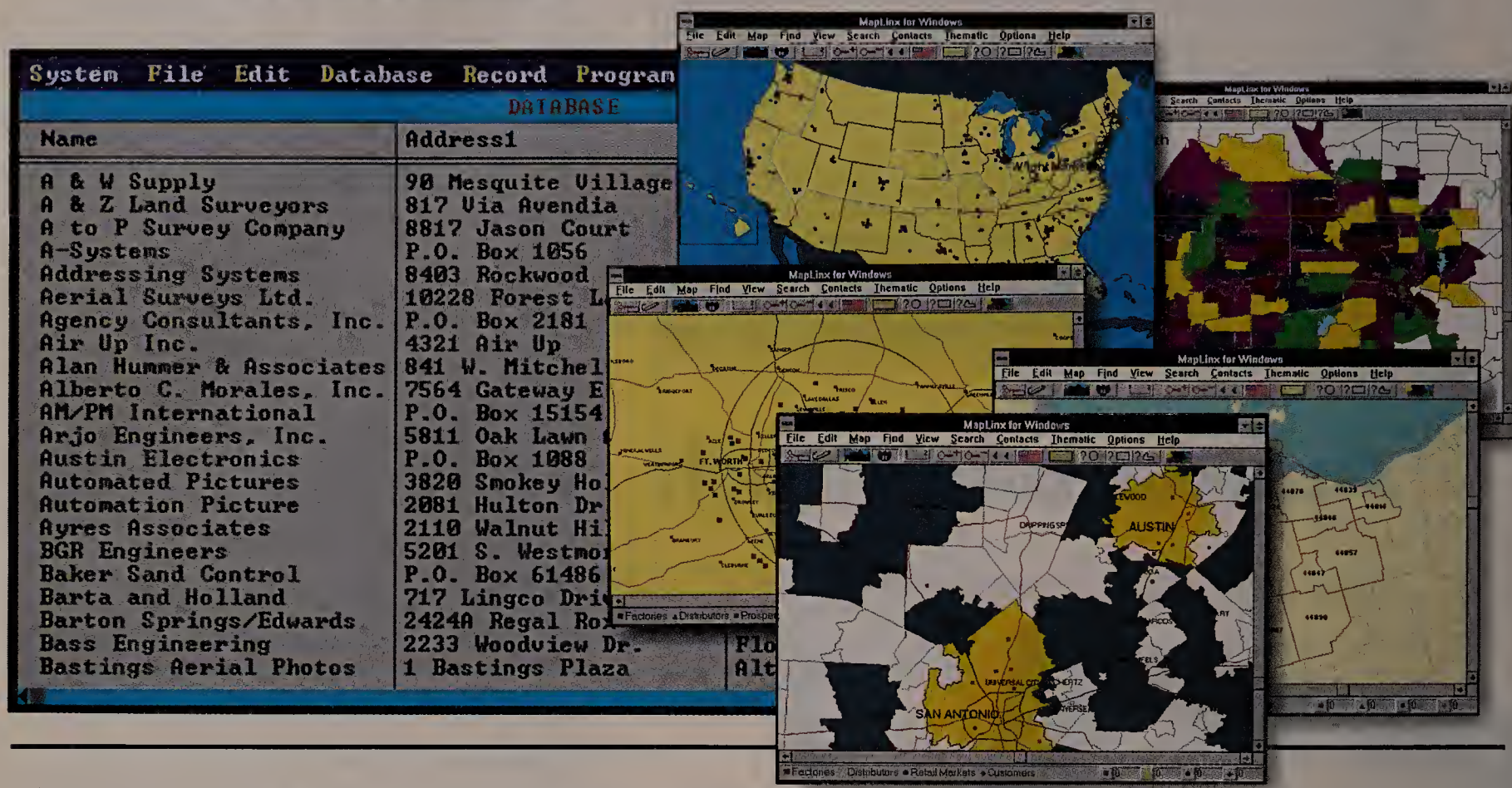

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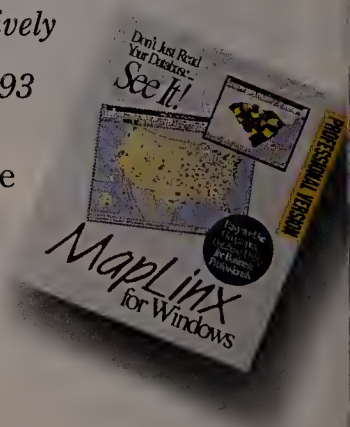

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WORD PROCESSING Q & A

Wandering Margins in WordPerfect 5.1

Q I hope you can help solve my problem with margins in WordPerfect 5.1 for DOS. I often need to retrieve a one-page document and insert it into a document already loaded into the program. Using **<Shift>-<F10>** works fine, but if the inserted document has different page margins than the existing document, the margins for all pages from the point of insertion onward change to those of the inserted document. I need to preserve the margins in both documents. Is there a way to keep the margin settings from changing?

Hal Skurnick, Chappaqua, New York

A You've run into a problem caused by the way the DOS version of WordPerfect 5.1 handles formatting codes. When you insert a document into an existing document, any codes in that inserted document are retrieved as well. That's fine, since it preserves the margins of the document you're inserting. Unfortunately, though, WordPerfect sees those new margins as the new default for the rest of the document and resets the margins for everything after the inserted material. There's no automatic way to correct this, but I can show you how to minimize the problem. The following tip assumes that you've set the margins in both of your documents instead of using WordPerfect's defaults.

With the main document on the screen, move the cursor to the place you want to insert the other document. Press **<Ctrl>-<Enter>** twice to insert two hard page breaks. You'll see two sets of paired dotted lines indicating the position of the page breaks. Now, position your cursor between the breaks, press **<Shift>-<F10>**, type in the file name of the document you want to insert, and press **<Enter>**. After the inserted document appears, press **<F2><Ctrl><Enter><F2>** to jump past the inserted material. Your cursor will appear just past the second hard page marker. Now press **<Shift>-<F8>** to access the Format menu and reset the margins to match those of the main document. (Note: If you do this frequently using the same margin settings, consider recording a macro using the **<Ctrl>-<F10>** command to automate the margin-setting commands.)

When you print the document, the inserted document will appear on its own page, unless you delete the hard page breaks.

Missing Symbol Fonts in WinWord

Q Several of my TrueType symbol and dingbat fonts don't appear in the font list of WinWord's Symbol dialog box, while some text fonts that have no symbols in them *do* show up. Can I change this font list? If not, how can I select Insert•Symbol to access these fonts?

Jiro Feingold, Seattle

A There's no simple way to alter the font list in the Symbol dialog box. But here's an easy trick you can use to force the dialog box to include any font that's available in Windows.

Start by positioning the cursor where you want to insert a symbol. Press **<Space>** followed by **<Shift>-<Left>** to insert and highlight a space. Now select *Format•Character* or click on the font pulldown list from the tool ribbon and choose the symbol or dingbat font you want. Select *Insert•Symbol*, then if the (Normal Text) entry isn't selected in the Symbols From font list, scroll through the list and select it. You'll see the characters from the font you just chose in the grid. To insert a character, just double-click on it. The symbol character will automatically replace your highlighted space character.

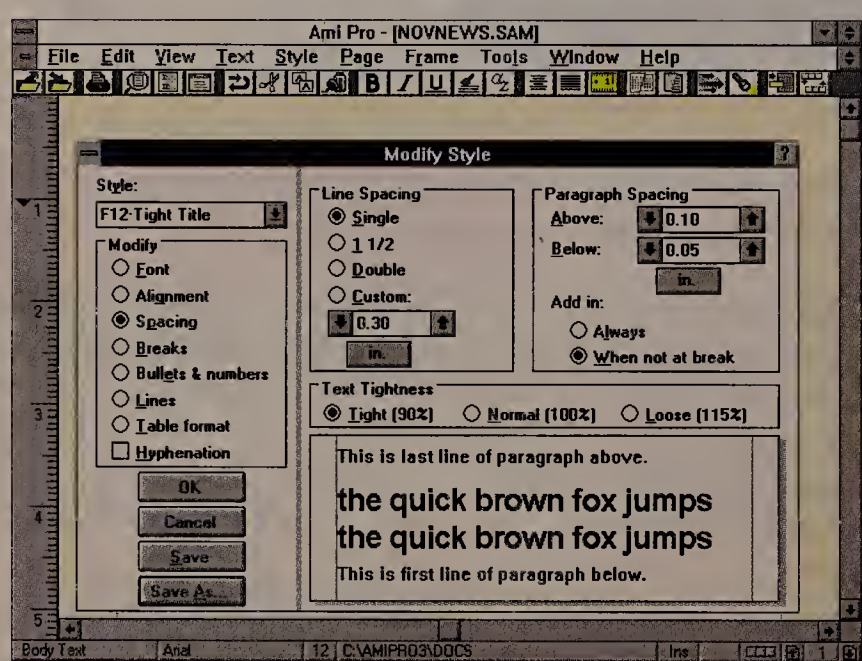

FIGURE 1: SHRINK OR EXPAND TEXT to make headlines fit just right from Ami Professional's Modify Style dialog box.

256-Color Speedup for WordPerfect for Windows

Q I use WordPerfect for Windows in a 256-color mode on my super-VGA card, but the program seems to run very slowly. Is there any remedy other than purchasing a faster video card?

Gregory Ward, Oakland, California

A A faster video card couldn't hurt, but if you have WordPerfect 5.2 for Windows or the April 1992 release of WordPerfect 5.1 for Windows, there's another way. You can hurry things up by forcing the program to write directly to the screen. To set this up, exit WordPerfect and return to Program Manager. Highlight the WordPerfect icon, then select *File•Properties* or press **<Alt>-<Enter>** to bring up the Program Item Properties dialog box. In the Command Line field, after WPWIN.EXE, type a space, then add **/FL** and click *OK*.

From then on, when you start the program you'll notice faster screen response, although you may also see some flicker if you press <Ctrl>-<F3> to update your screen. The /FL command line switch also prevents crashes with some super-VGA drivers in 256-color mode.

Tight and Loose Text in Ami Pro

Q Occasionally I need to shrink some text horizontally in Ami Pro. For example, if a title in a document is just one or two characters too wide, I'd like

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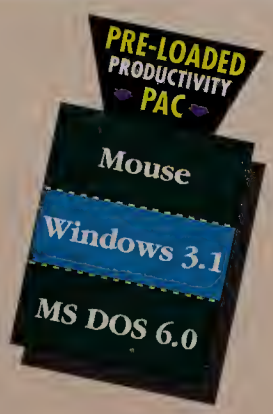

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to squeeze the text to fit on one line. But I don't want to change fonts. Do you have any suggestions?
Angela Whitbread, Cedar Rapids, Iowa

A I can suggest a method, but it's rather clumsy until you get used to it. With your cursor positioned in the text you want to squeeze, select *Style•Modify Style*. In the Modify Style dialog box, select the *Spacing* option in the Modify list. The dialog box will change. In the middle right portion of the dialog box (see **FIGURE 1**), you'll find three Text Tightness options, Tight (90 percent), Normal (100 percent) and Loose (115 percent). Select *Tight* to close up your text a bit.

Now for the tricky part. Don't click OK yet or your Tight setting will apply to all the text that uses the same style name as the text you want to shrink. Click *Save As* first. In the next dialog box, type in a new name for your tightened style, say, **Tight Title**, then click *OK*. You'll see your new style in the Style box. Now click *OK* again. To apply this new style to the paragraph containing the cursor, select *Style•Select A Style*, choose *Tight Title* from the dialog box, and you'll see the text tighten up.

This new style name will be saved with that document, but it won't appear in any new documents you may create. To save the Tight Title style (or any other style you might change) permanently in the current style sheet file, select *Style•Save as a Style Sheet*. Make sure the With Contents box is unchecked, then click *OK* to save the style sheet with its original name. Confirm overwriting the existing style sheet by clicking *Yes* in the box that appears.

Borderless Tables in WordPerfect

Q I use WordPerfect 5.1 for DOS to create and maintain my personal telephone list. To simplify data entry, I use the <Alt>-<F7>TC command to set up a table with three columns—one for the name plus one for a voice number and one for a fax number—for each entry. This works great, and it lets me move from column to column by pressing <Tab>. But when I want to print a copy of the phone list, I'd rather not print the border lines. I know I could remove the borders altogether with the <Alt>-<F7>L command, but I really like seeing them on the screen. Is there a way to shut off the borders only when I print the list?
Imran T. Ahmed, Fairfax, Virginia

A There is a solution, but it's not obvious. Before you print your phone list, press **<Shift>-<F7>GN**. This command calls up the printing menu and then sets Graphics Quality to the Do Not Print option. Do Not Print suppresses all graphics and line printing, including those pesky borders. When you save the file, this setting is saved with your document, so the borders won't print even if you change other elements of the file. However, the setting is not saved as a WordPerfect default for other documents.

WordPerfect 5.*x* for Windows users can apply the same technique. After creating a table with the *Layout•Tables•Create* command, select *File•Print*. In the Print dialog box, click and hold the *Graphics Quality* button, and choose the *Do Not Print* option in the list. As with the DOS version, the setting is stored with the document, but not as a WordPerfect default for other documents.

There's just one cautionary note: With the Graphics Quality•Do Not Print option set, all of the graphics in your document are suppressed, including other lines, graphical images, special characters created with the Compose feature, and background shading.

Reversed Printing in WinWord

Q Is it possible to print reversed (white on black) type in Word for Windows 2.0c? I've tried doing this but haven't had any success. I can make the text look fine on the screen: I select it, choose *Format•Character*, set the color for selected text to white, then select *Format•Border•Shading* and set the background color to black. But when I print I get just a black box. I'm using TrueType fonts with an HP LaserJet IIID printer.
Mark Paciga,
Rothersay, New Brunswick, Canada

A You've hit upon the right way to produce reversed type. Unfortunately, your printer refuses to go along with the program. Word for Windows has trouble printing TrueType fonts in white on a black background on some printers.

Here's how to impose your design sense on your uncooperative printer. Before printing your document, select *File•Print Setup*. With your printer highlighted in the Printer list, click the *Setup* button. In the dialog box that appears, click the *Options* button, then uncheck the *Print TrueType as Graphics* check box. Click *OK* until you return to your document, then select *File•Print* to print your document. Your reversed type should be just right.

Note: If you don't see an Options button, you'll need to update your printer driver. Contact Hewlett-Packard at 303/353-7650.

By the way, reader Bryan Davis has written a macro that automates the process of reversing type in WinWord. You'll find it in this month's *Star-Dot-Star* column.

By George Campbell

George Campbell is a contributing editor for PC World. Word Processing *welcomes your questions. See page 10 for contact information.*

POWER TIP no.295

Counting WinWord Words

To get a word count faster than Word for Windows allows on its own, use the Tools • Macro command to create this macro:

```
Sub MAIN
Dim DLG As Dialog FileSummaryInfo
GetCurValues DLG
Print DLG.NumWords
End Sub
```

When you run the macro, the current word count appears on the status line. For quick access to the macro, use Tools • Options to assign it to a key, tool bar button, or menu.

Patrick Marshall
Silver Spring, Minnesota

WINDOWS Q & A

Custom File Manager Menu

Q I noticed that after installing DOS 6.0 and the accompanying Windows files, File Manager now has a Tools menu that lets me launch Microsoft Anti-Virus and Backup utilities. But I already own Norton Backup for Windows, and after trying both, I'd like to stick with Norton. Can I launch Norton from the new Tools menu?
Barbara Baker,
Farmington Hills, Michigan

A It's not surprising that you'd prefer Norton Backup for Windows; Microsoft Backup is a licensed, somewhat stripped-down version of the Norton product. Fortunately, it's easy to substitute any third-party backup program for its DOS 6.0 counterpart and launch the new utility from File Manager's Tools menu. Just rename the new utility's executable file to match the Microsoft Backup executable file (MWBACKUP.EXE), overwriting the Microsoft Backup utility in the process. (If you don't want to lose Microsoft Backup, copy MWBACKUP.EXE into another directory before going on.)

In File Manager, locate and select the Norton Backup executable file NBWIN.EXE. Select *File•Copy* and in the To text box, type the drive, path, and executable file name of the DOS 6.0 utility you want to replace. In this instance, you might type **C:\DOS\MWBACKUP.EXE.** Then click *OK* and, if requested, click *OK* again to confirm that you want to replace one file with another. You will now be able to launch Norton Backup from File Manager's Tools menu.

If you later decide that you would like to replace Microsoft Anti-Virus with some other program, follow the preceding steps to overwrite MWAV.EXE, the Microsoft Anti-Virus executable file. Then remove any references to the Microsoft VSafe and MSAV programs in AUTOEXEC.BAT and to the VSafe Manager (MWAVTSR.EXE) in WIN.INI. Finally, delete any Anti-Virus icons in Program Manager's Startup group. The next time that you're in File Manager, you will be able to launch your chosen utilities from the Tools menu.

Stuck Windows

Q I can't seem to size windows dynamically anymore. My choices are either full screen, half screen, or a tiny box that barely shows the word Ami, much less Pro. Why is Windows doing this, and how can I make it stop?
Kenny Rubenstein, New Orleans

A Sounds like someone's been messing with your granularity—and I don't mean your sugar bowl. Launch Control Panel and double-click the *Desktop* icon. In the Sizing Grid section, change the Granularity setting to a lower number. This number creates an invisible grid to which your windows "snap" whenever you size or position them. If the setting is too high (the maximum is 49), you can get the bizarre results you describe. For unfettered control, set this number to **0** and click *OK*.

Simpler Associations

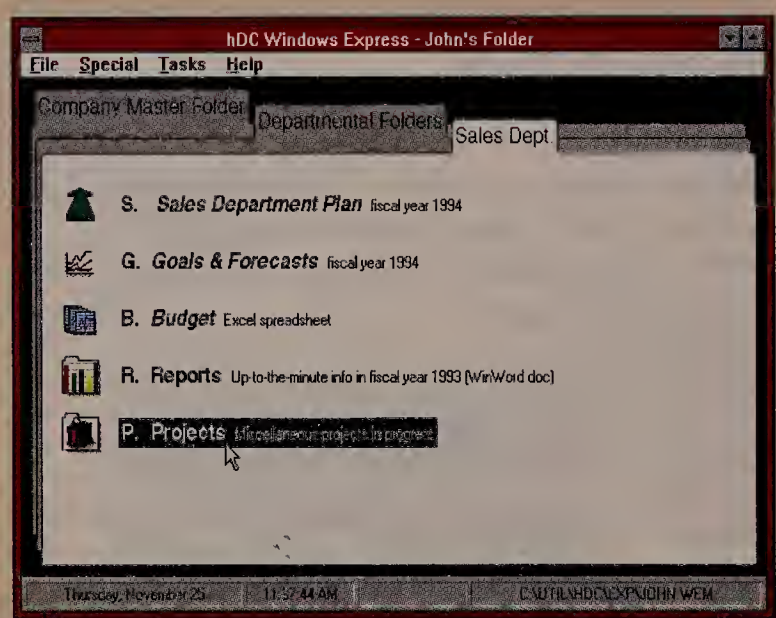
Q I'm teaching our staff how to associate file extensions with applications, so they can launch documents by double-clicking them in File Manager. Some users are confused by all the PATH information shown in the File•Associate dialog box. Is there a way to hide this clutter and show just the program names?
Reed Conger, San Antonio

A You can essentially push this minutiae to the side by inserting some extra spaces between the program name (such as PageMaker) and its path information (such as F:\PM5\PM5.EXE). The trick involves editing REG.DAT, which contains that information, using Windows' Registration Info Editor.

First, make a backup copy of the REG.DAT file in your Windows directory. Then, in either File Manager or Program Manager, select *File•Run*, type **REGEDIT**, and press **<Enter>**.

From the list of Registered File Types, select the program name that you want to change and choose *Edit•Modify File Type*. The program name

Windows Toolbox



Some people look at Windows and ask, "Why can't it be more like a Mac?" hDC asks, "Why not make it better?" Windows Express 4.0 replaces the Program Manager with a simple, intuitive menu system that makes launching programs a breeze. And unlike with Program Manager, groups are kept on file folders that you can quickly thumb through. You can even nest folders within each other. Novices will love the simplicity; system administrators will love the capability to hide the plumbing—and keep users from wandering into areas they shouldn't. Express also comes with a powerful macro language that can launch programs, open files, set up DDE links, and more. List price is $99.95, with volume discounts available for the run-time version. hDC Computer Corp., 800/321-4606, 206/885-5550, 206/881-9770 (fax). Reader service no. 640

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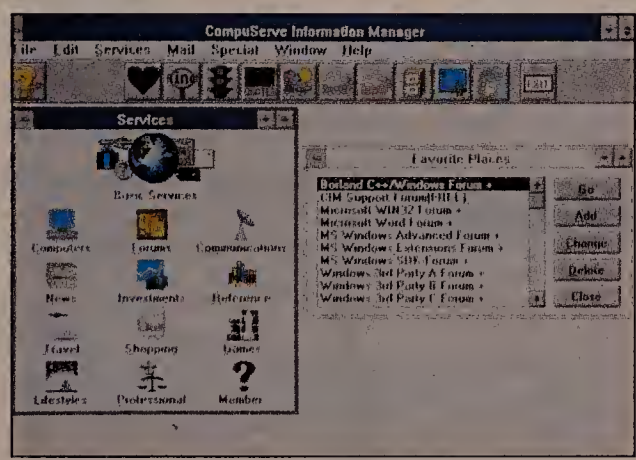

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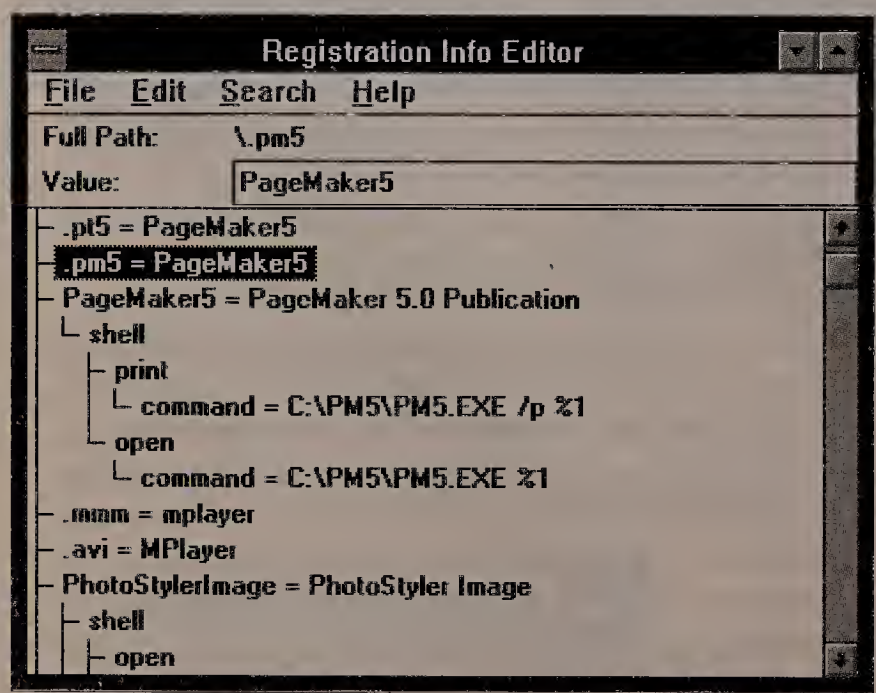
will appear in the File Type text box. Place the cursor at the end of the name, type 30 or 40 spaces, and click *OK*. The next time a user picks File•Associate in File Manager, the path information for this program should be pushed completely out of view. If it isn't, repeat the steps and insert a few more spaces.

Since you need to modify a number of items, here's a faster method. In File Manager or Program Manager, choose *File•Run*, type **REGEDIT /V**, and press **<Enter>**. This starts the Registration Editor in advanced mode and displays all the programs, associated file extensions, and other registration database information, in a tree diagram.

To edit an item, click or cursor down the tree to an entry that branches directly off the "trunk," such as .pm5= PageMaker5. (Do *not* select subbranches.) Press **<Tab>**, and the cursor jumps to the Value field at the top of the window. Place the cursor after the program name and type 30 or 40 spaces. Press **<Tab>** again to return the cursor to the previous position on the tree, and move on. When you've edited all the descriptions, select *File•Save Changes*.

Other speed tips: You can jump from entry to entry in the tree by pressing the first letter of the item until you reach it. You can also speed editing by copying a slug of spaces to the Clipboard. The next time you are in the Value field, simply press **<Ctrl>-V** to paste them in.



WINDOWS' HIDDEN TOOL: REGEDIT lets you push clutter to the side by simplifying file associations, OLE settings, and more.

Smarter Paintbrush Defaults

Q When I work with graphics files, I generally use PCX files. But when I open Paintbrush to view an image, the files that show up automatically in the File Name list are all BMP and DIB files. I don't mind the BMPs, but I've never used a DIB file. Can Paintbrush show me PCX files by default?
John Terzian, Buffalo

A Sure thing. First, make a backup of PBRUSH.EXE (Paintbrush's executable file), which is in the Windows directory. Now launch Windows Write, and open PBRUSH.EXE, making sure that you click *No Conversion* in the resulting Write dialog box. Search for '.BMP;*.DIB'. Delete the letters DIB and insert **PCX**; then replace the PCX entry (the fourth extension on that line) with **DIB**. Save the file and exit. When you next launch Paintbrush, you'll see both BMP and PCX files by default.

Sneaking Out of Windows, Part I

Q At night I need to run unattended Windows tasks, such as updating an Excel spreadsheet and then exiting to DOS. I have no problems automating this, except for the last step. How can I make Windows quit when Excel does?
Karl Ohler, Calgary, Alberta, Canada

A You could write an Excel macro that exits Windows, but here's a procedure that will work for any Windows program. Simply make Excel your Windows shell. When you start Windows, Excel will start instead of Program Manager, and when you exit Excel, Windows will also go bye-bye.

First, make a backup copy of SYSTEM.INI. Make another copy called SYS_XL.INI. Open that file with a text editor and locate the line 'SHELL=PROGMAN.EXE' in the [boot] section. Edit the line so it reads **SHELL=C:\EXCEL\EXCEL.EXE** (change the drive and path to reflect Excel's location on your hard drive). Then save the file.

Now create a batch file that substitutes SYS_XL.INI for SYSTEM.INI, launches Windows, then restores SYSTEM.INI when finished. The batch file should log on to your Windows subdirectory and contain these commands:

```
COPY SYSTEM.INI SYSTEM.ORG
COPY SYS_XL.INI SYSTEM.INI
WIN
COPY SYSTEM.ORG SYSTEM.INI
```

When Windows starts, Excel will start automatically and run your auto-executing macro. When the macro exits Excel, Windows will shut down as well.

You can use this technique with Windows programs other than Excel—even Solitaire—though some programs can't function as the Windows shell.

Sneaking Out of Windows, Part II

Q I'm responsible for a PC used by patrons at a library. We run everything—including some Windows applications—via a DOS menuing program. But when users exit a Windows app, they end up at the Program Manager instead of the DOS menu. Can I write a batch file so that exiting a Windows program exits Windows as well?
John M. Huber, Milwaukee

A Well, if you can squeeze a few more dollars out of the library system, I'd reverse your strategy: Run everything from Windows, including DOS programs, using a Windows menu program such as Windows Express from hDC Computer Corporation (see "Toolbox").

However, if you insist on sticking with DOS, consider the procedure described in the previous tip. You'll need to create a batch file and modified SYSTEM.INI for each Windows application and tie each batch file to the appropriate menu option.

By Scott Dunn

Scott Dunn is a contributing editor for PC World *and coauthor of* 101 Windows Tips *(Peachpit Press, Berkeley, California, 1992).* Windows Q&A *welcomes your questions. See page 10 for contact information.*

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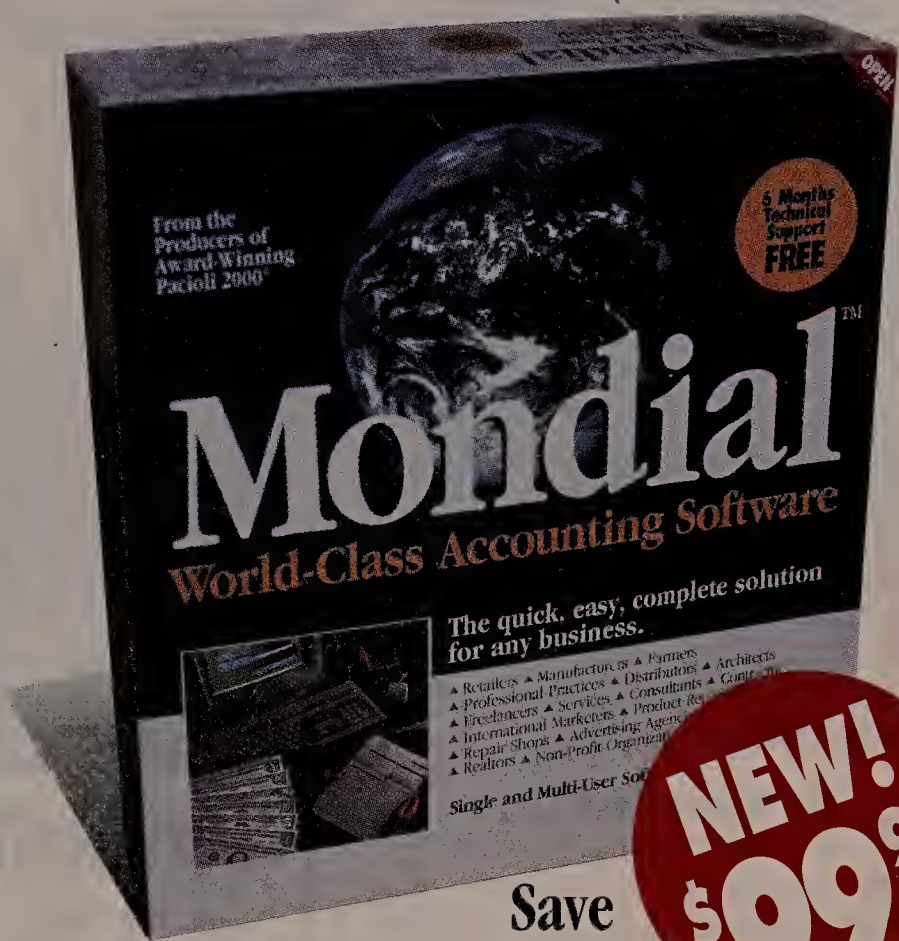

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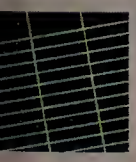

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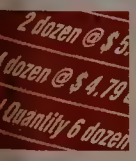

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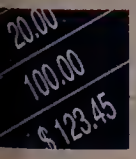

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The fastest way to trigger an IRS audit is to exceed the "normal" range on one of your deductions. You need to know what the IRS looks for on a line-by-line basis.

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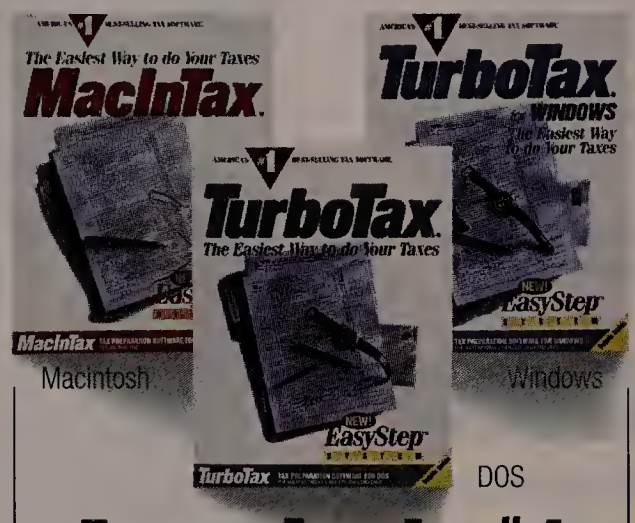

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PC MAGAZINE EDITORS' CHOICE FEBRUARY 23,1993 TURBOTAX FOR DOS

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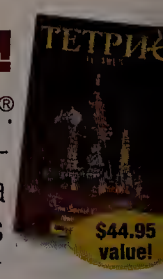

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DATA MANAGEMENT Q & A

Placing Calculated Values in a Paradox Table

Q Is there a way, during data entry in Paradox 4.0, to fill in a real field (as opposed to a calculated one) automatically with the result of a calculation? I can't make an expression like [Field A] = [Field B] * [Field C] work.
Sang-Ho, Orange, California

A It's unfortunate, but there's no easy way to make Paradox insert calculation results as you enter data. However, I've written a short PAL program, DOCALCS.SC, that goes through an entire data table, computing the value for each record and inserting it into the correct field. This isn't an optimal solution, because you have to remember to play the script after you've entered or edited data, but it's easy to implement.

First, use any text editor to create an ASCII text file like the one in **FIGURE 1**. To use the editor included with Paradox, select *Scripts•Editor•New*. Name the file DOCALCS.SC. As you enter the text, replace the word "Table" in the fourth line with the name of your table, but be sure to keep the quotation marks around it. In place of my sample calculation, insert as many formulas as you need between the SCAN and ENDSCAN commands; remember that field names in calculations must appear inside square brackets. (DOCALCS.SC is also available on PC World Online.)

Once you save the file, you're ready to go. Any time you want to update your table and assign the calculated field values, simply run the script via the *Scripts•Play* command.

There are better solutions—if you're willing to work on them. It's possible to write a PAL program that would automatically fill in a field with a calculated result as each record is entered, but it's not easy. Scripts that provide customized functions during data entry are inherently tricky, and there isn't a generic version I can offer here. All told, you'll find my DOCALCS program much easier.

```
CLEAR
@ 22,30
?? "Updating calculated fields...please wait"
COEDIT "Table"
SCAN
[Field A] = [Field B] * [Field C]
ENDSCAN
DO_IT!
MESSAGE "Update complete...press any key"
x = GETCHAR()
```

FIGURE 1: ASSIGN CALCULATED VALUES to regular fields with this simple Paradox script.

Getting ASCII Information Into dBASE

Q I need to import ASCII files into dBASE IV, but the Tools•Import menu option doesn't support them. What's the easiest way to get ASCII information into a dBASE file?
Perry Smith, Diamond Bar, California

A There's nothing in the dBASE IV menus for importing ASCII files; you must do it at the dot prompt with the APPEND FROM command. APPEND FROM can import two different types of ASCII files, delimited and fixed length, and you have to know which kind you're dealing with. In a delimited file, each record is on its own line, with the field values separated by commas or some other character. In addition, character-type fields are usually surrounded (delimited) by a particular character, usually quotation marks. A delimited ASCII file looks something like this:

```
"Dan","Kelly",59
"Mary","Maher",29
"Lincoln","Delaney",78
```

Fixed-length ASCII files also have one record on each line, but there are no field separators or delimiters. Instead, each field starts at the same horizontal position on every line, like this:

```
Dan     Kelly     59
Mary    Maher     29
Lincoln Delaney   78
```

Once you know which kind of ASCII file you're dealing with, you must make sure you have a dBASE data file with the same structure. If you don't already have such a file, you'll have to create one. Be careful that you have all the correct fields and that they're all the right type and length. The length is especially important if you're importing a fixed-length file, because dBASE uses the field length to determine what goes into what field. For instance, in the second sample, the only way dBASE knows to start the last-name field with the ninth column is if the first-name column is eight characters long. If you use a nine-character first-name column, the third record would end up with the first name 'Lincoln D' and the last name 'elaney'.

Once you have everything set up and the proper data file open, go to the dot prompt and enter either **APPEND FROM** *filename* **DELIMITED** or **APPEND FROM** *filename* **SDF**, where *filename* is the name of your ASCII file. SDF, which stands for Standard Data Format, is an old dBASE term for fixed-length data. If your text file is delimited with something other than quotes, use **APPEND FROM** *filename* **DELIMITED WITH** *character*, where *character* is the delimiter.

USER GROUP TIP

Quick Zoom in Access

Many of the entry lines in Access scroll across as you fill them with a formula, field name, or other information. The scrolling makes things difficult to read and leads to typing errors. An easy solution is to press <Shift>-<F2> and type in a Zoom box, where you can see what you're typing without scrolling.

Bill Rothermal, Twin Cities PC Users Group

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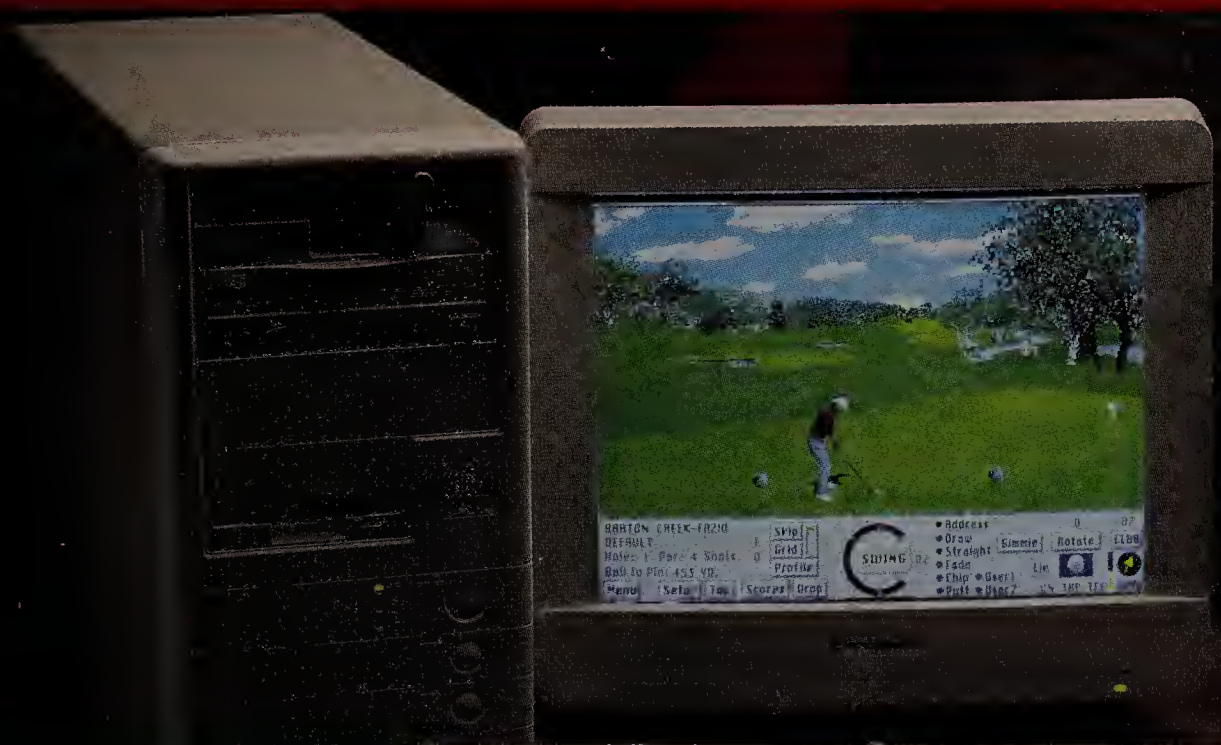

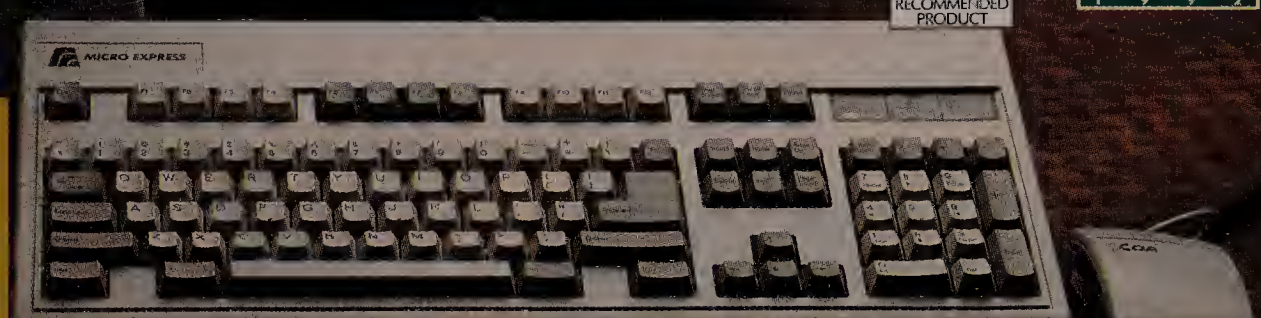

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Insufficient Room for Paradox/Win

Q I was creating a multitable form in Paradox for Windows, using the sample tables ORDERS.DB, LINEITEM.DB, and CUSTOMER.DB that come with the program. After I selected my tables and set up my relationships in the Data Model, I clicked OK. Instead of the Design Layout screen, I got the message 'Insufficient room for detail records of ORDERS.DB'. What is "room" in this context? I am unaware of any resource in the PC called "room." It certainly can't mean RAM or hard disk space, as my system has plenty of each.
Paul K. Winter, Toronto, Ontario, Canada

A The first time I saw this message, I was just as puzzled as you are about what might be causing the problem. After some consideration, I realized that the 'Insufficient room' message refers to the space available on the new form. Depending on the number of tables you're relating, how many fields are in those tables, and the size of your page layout, there may not be room for Paradox to fit everything on the form page. When this is the case, Paradox warns you with the 'Insufficient room' message. There are several solutions to this problem.

One quick fix is to change the size of the form page. After you receive the 'Insufficient room' message, you'll be in the Design Layout dialog box. From there, click the *Page Layout* button. In the resulting dialog box, increase the Width and Height numbers in the Custom Size area. If you add enough room to the page, Paradox can bring up the new form in a design window without displaying the 'Insufficient room' message. You may end up with incomplete fields or table objects on the form, but you can adjust the size of these objects and move them around as needed.

Another solution is to be selective about which fields Paradox should put on the new form; you probably don't need all of them. Again, there's a button in the Design Layout dialog box that will do the trick: *Select Fields*. In the resulting dialog box, you'll be able to remove fields from the list of those set to appear in the form.

There's yet another way to deal with the 'Insufficient room' message: Ignore it. In the Design Layout dialog box, just click *OK* as if you hadn't received an error message at all. The default form that comes up will be incomplete, leaving out one or more of the detail tables you selected using the Data Model. But you're free to rearrange or remove any of the fields that did end up on the form to make room for the missing table(s). Then use the Table button on the SpeedBar to add the detail table(s).

The option that's best for you depends on the number of detail tables you're working with and whether you need to include all the fields from all the tables. Don't be afraid to experiment. Once the design window is open, you can always use *Design • Design Layout* to go back to the drawing board.

By Celeste Robinson

Celeste Robinson is a contributing editor for PC World *and the author of* The Paradox 4.0 Handbook *(Bantam Computer Books, New York, 1992).* Data Management *welcomes your questions. See page 10 for contact information.* ■

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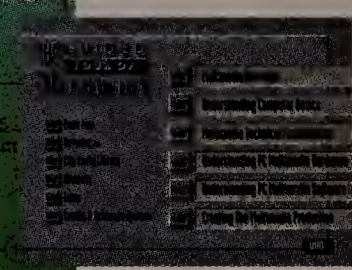

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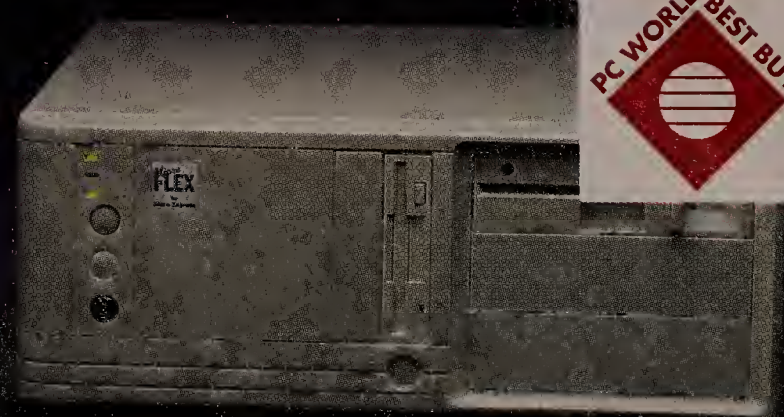

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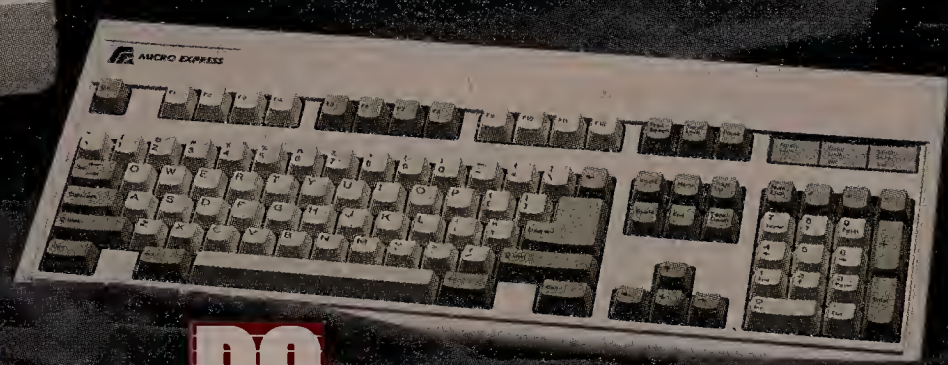

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PC World, June 1993

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InfoWorld, February 8, 1993

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PUBLISHING & PRESENTATIONS MAKEOVER

Quick and Easy Newsletters

Let's say you're looking for a quick and easy way to communicate regularly with your customers or co-workers, but you don't know much about desktop publishing and you don't have a lot of money to spend on fancy software. What's a manager to do?

You could start by looking at this month's *PC World* make-over candidate, a newsletter from the library in Fairhope, Alabama. Editor Suzanne S. Barnhill is not a professional desktop publisher. She just wanted to stay in touch with her constituency—the folks who donated time or money to keep the library going—while adhering to a shoestring budget. A simple newsletter was the answer.

Barnhill produces her semiannual publication using some tools found in many offices: Microsoft Word for Windows running on a Gateway 2000 486-33. She prints it on a LaserJet 4 and duplicates it at a local copy shop.

We proposed to redesign Barnhill's newsletter using the same basic tools she was already using. The only change was to add PagePlus 2.0, a $60 Windows desktop publishing program from Serif.

We started by asking a few questions. Who is the audience and what do we, as publishers, want to convey to them? According to Barnhill, Fairhope is a quiet little town populated primarily by senior citizens. The newsletter, she explained, should convey the spirit of the library to those who have helped support it. The library itself is a modern building that houses a fairly old collection. That got us thinking that the newsletter should combine elements of the old and the new.

A Bit of the Old

Looking back at the original, we particularly liked three elements that conveyed a sense of the old. The woodcut next to the original newsletter's title imparts an appropriately bookish feel. In fact, we liked the motif so much we decided to add more woodcuts. Since we know Barnhill has access to a scanner, we used a collection of public domain art from Dover Books (Dover Publications, 516/294-7000; electronic version available from Random House Electronic Publishing, 800/726-0600). The graphics add visual interest to the page and help attract readers.

We also liked the Garamond typeface, a highly readable classic. We specified 12-point Garamond Light with 14-point line spacing (the original used 13-point line spacing) to ensure legibility for an audience consisting mostly of older readers. Finally, though we generally recommend white paper for newsletters, we decided to keep the buff-colored paper of the original since it lends an antique look.

The biggest problem with the original design was its two-column layout, which forms an unrelenting sea of gray text. There's little to relieve the eye and scant encouragement to move from one story to the next. Worse, no element in the original newsletter appeared more important than any other.

A Bit of the New

We decided to break the page into three columns, which allows for greater flexibility in assembling individual stories of varied lengths. Now the lead story in every issue starts on the upper left side of the page and runs across two columns.

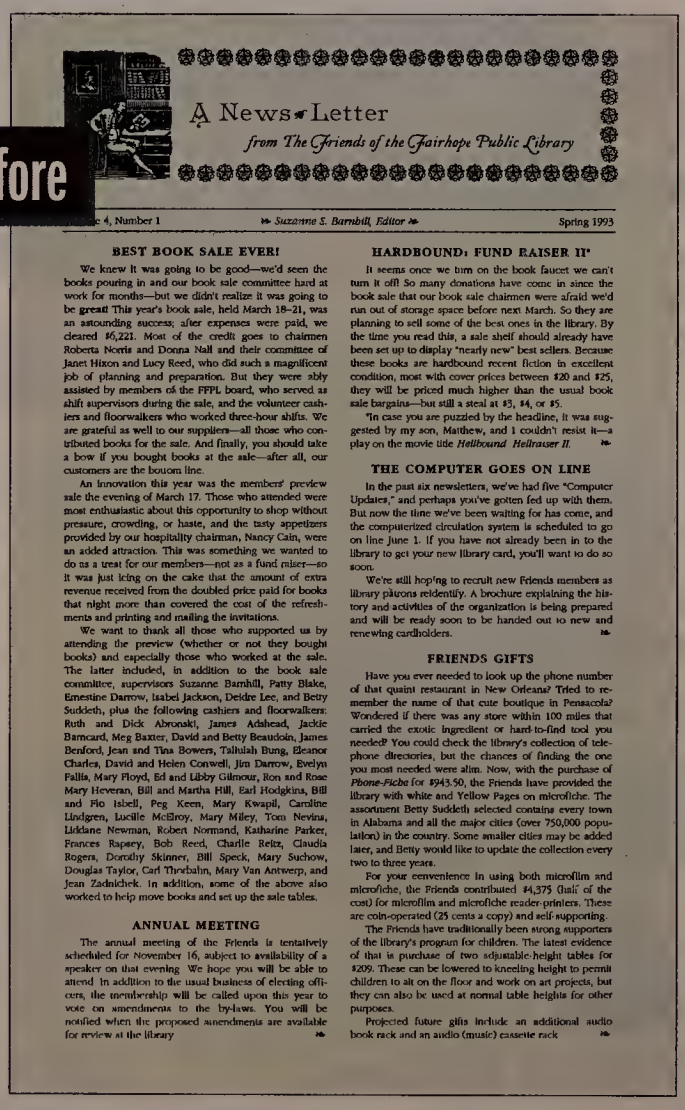
We also had to do something about the masthead. Though the title *A Newsletter* is charmingly genteel, it's too generic. We decided to replace it with the catchier *Biblio File*. We also added some visual drama by reversing the text below the title in white on a black panel. Because this white type was going to be reproduced on a copier, we used larger type—13-point Garamond—to ensure readability.

The only problem with the redesign: There's less room for text because of the added graphics and the increased space between lines; the space for text has been reduced by 20 to 25 percent, but some judicious editing should take care of the problem.

By David Brickley and Dan Miller

The redesign was performed by David Brickley, a designer based in Moss Beach, California. Dan Miller is an assistant editor for PC World. Publishing & Presentations *welcomes your business document and presentation make-over candidates and your publishing and presentations questions. See page 10 for contact information.*

Before



A News Letter

from The Friends of the Fairhope Public Library

c 4, Number 1 — *Suzanne S. Barnhill, Editor* — Spring 1993

BEST BOOK SALE EVER!

We knew it was going to be good—we'd seen the books pouring in and our book sale committee hard at work for months—but we didn't realize it was going to be **great!** This year's book sale, held March 18–21, was an astounding success; after expenses were paid, we cleared $6,221. Most of the credit goes to chairmen Roberta Norris and Donna Nall and their committee of Janet Hixon and Lucy Reed, who did such a magnificent job of planning and preparation. But they were ably assisted by members of the FFPL board, who served as shift supervisors during the sale, and the volunteer cashiers and floorwalkers who worked three-hour shifts. We are grateful as well to our suppliers—all those who contributed books for the sale. And finally, you should take a bow if you bought books at the sale—after all, our customers are the bottom line.

An innovation this year was the members' preview sale the evening of March 17. Those who attended were most enthusiastic about this opportunity to shop without pressure, crowding, or haste, and the tasty appetizers provided by our hospitality chairman, Nancy Cain, were an added attraction. This was something we wanted to do as a treat for our members—not as a fund raiser—so it was just icing on the cake that the amount of extra revenue received from the doubled price paid for books that night more than covered the cost of the refreshments and printing and mailing the invitations.

We want to thank all those who supported us by attending the preview (whether or not they bought books) and especially those who worked at the sale. The latter included, in addition to the book sale committee, supervisors Suzanne Barnhill, Patty Blake, Ernestine Darrow, Isabel Jackson, Deidre Lee, and Betty Suddeth, plus the following cashiers and floorwalkers: Ruth and Dick Abronski, James Adshead, Jackie Barnard, Meg Baxter, David and Betty Beaudoin, James Benford, Jean and Tina Bowers, Tallulah Bung, Eleanor Charles, David and Helen Conwell, Jim Darrow, Evelyn Falls, Mary Floyd, Ed and Libby Gilmour, Ron and Rose Mary Heveran, Bill and Martha Hill, Earl Hodgkins, Bill and Flo Isbell, Peg Keen, Mary Kwapil, Caroline Lindgren, Lucille McIlroy, Mary Miley, Tom Nevins, Liddane Newman, Robert Normand, Katharine Parker, Frances Rapsey, Bob Reed, Charlie Reitz, Claudia Rogers, Dorothy Skinner, Bill Speck, Mary Suchow, Douglas Taylor, Carl Thorbahn, Mary Van Antwerp, and Jean Zadnichek. In addition, some of the above also worked to help move books and set up the sale tables.

ANNUAL MEETING

The annual meeting of the Friends is tentatively scheduled for November 16, subject to availability of a speaker on that evening. We hope you will be able to attend. In addition to the usual business of electing officers, the membership will be called upon this year to vote on amendments to the by-laws. You will be notified when the proposed amendments are available for review at the library.

HARDBOUND: FUND RAISER II

It seems once we turn on the book faucet we can't turn it off! So many donations have come in since the book sale that our book sale chairmen were afraid we'd run out of storage space before next March. So they are planning to sell some of the best ones in the library. By the time you read this, a sale shelf should already have been set up to display "nearly new" best sellers. Because these books are hardbound recent fiction in excellent condition, most with cover prices between $20 and $25, they will be priced much higher than the usual book sale bargains—but still a steal at $3, $4, or $5.

"In case you are puzzled by the headline, it was suggested by my son, Matthew, and I couldn't resist it—a play on the movie title *Hellbound Hellraiser II*.

THE COMPUTER GOES ON LINE

In the past six newsletters, we've had five "Computer Updates," and perhaps you've gotten fed up with them. But now the time we've been waiting for has come, and the computerized circulation system is scheduled to go on line June 1. If you have not already been in to the library to get your new library card, you'll want to do so soon.

We're still hoping to recruit new Friends members as library patrons evidently. A brochure explaining the history and activities of the organization is being prepared and will be ready soon to be handed out to new and renewing cardholders.

FRIENDS GIFTS

Have you ever needed to look up the phone number of that quaint restaurant in New Orleans? Tried to remember the name of that cute boutique in Pensacola? Wondered if there was any store within 100 miles that carried the exotic ingredient or hard-to-find tool you needed? You could check the library's collection of telephone directories, but the chances of finding the one you most needed were slim. Now, with the purchase of *Phone-Fiche* for $943.50, the Friends have provided the library with white and Yellow Pages on microfiche. The assortment Betty Suddeth selected contains every town in Alabama and all the major cities (over 750,000 population) in the country. Some smaller cities may be added later, and Betty would like to update the collection every two to three years.

For your convenience in using both microfilm and microfiche, the Friends contributed $4,575 (half of the cost) for microfilm and microfiche reader-printers. These are coin-operated (25 cents a copy) and self-supporting.

The Friends have traditionally been strong supporters of the library's program for children. The latest evidence of that is purchase of two adjustable-height tables for $209. These can be lowered to kneeling height to permit children to sit on the floor and work on art projects, but they can also be used at normal table heights for other purposes.

Projected future gifts include an additional audio book rack and an audio (music) cassette rack.

After

If you use reversed type and photocopy your newsletter, be sure to make the type big enough so that it reproduces legibly.

BIBLIO FILE

To The Friends of Fair Hope Library

Volume 4, Number 1 Spring 1993

You must establish a hierarchy of information—one story should be *visibly* more important than the others on the page.

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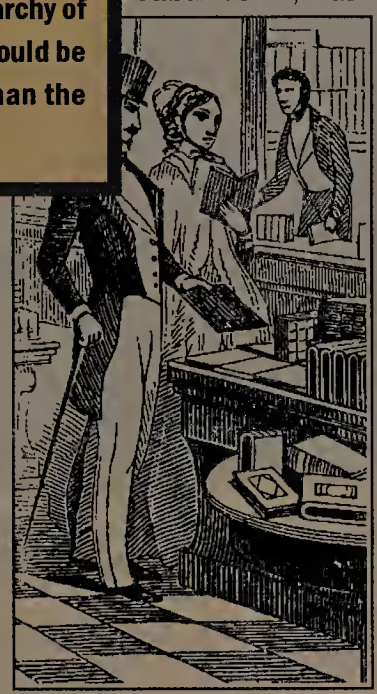

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[illegible]und Raiser II

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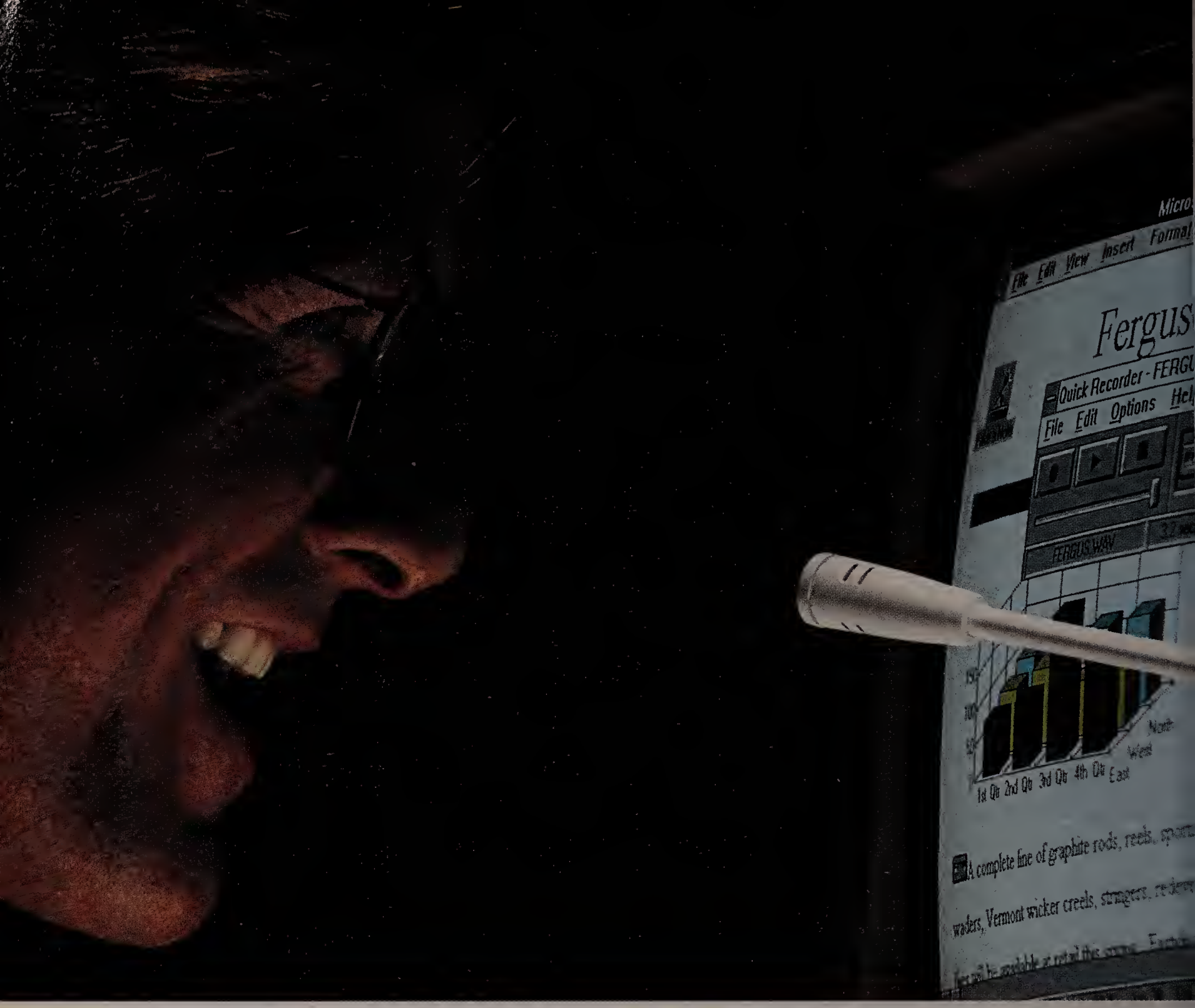
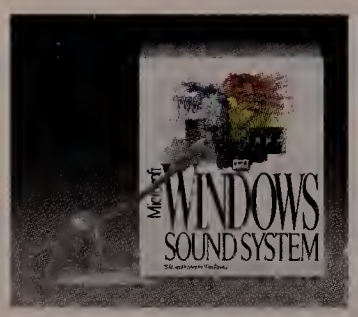


FIRST WE MADE WINDOWS. NOW IT'S TIME TO TALK.



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COMMUNICATIONS Q & A

Decoding Modem Talk

Q Can you explain what a modem initialization string is?
Warren Edgar, Granite Bay, California

A It may look like gibberish, but it's actually a string of commands that your communications software sends to your modem each time you load the software. For example, these commands might include the number of seconds that the modem should wait for a dial tone. A typical initialization string looks like this:

ATE1Q0V1X4&C1&D2 S7=60 S11=55 S0=0^M

Every string of commands sent to the modem begins with AT, the command that gets the modem's attention. The string often ends with ^M, the command that the modem recognizes as <Enter>.

The curious commands that begin with S are S-register settings. Every modem has a selection of 28 special memory registers that can be set to define some operation. For example, register S7 sets the amount of time the modem waits for a carrier or dial tone—something you'll need to fiddle with if you're dialing through an office phone system or long distance using a calling card. Register S11 defines how long the modem pauses between each touch-tone number. Register S0 selects which ring the modem will answer on.

The other commands in the string are fairly standard. E1 displays the commands your software sends to the modem. Q0 lets you see the modem's responses. V1 displays those responses as words rather than as numbers. X4 enables all the modem's connect features. The command &C1 tracks the presence of the data carrier signal on the cable between the PC and the modem. The next command, &D2, makes the modem hang up when the PC drops its data-terminal-ready signal.

Good communications software will include a customized modem initialization string for every major brand of modem. If your modem type is not well known, the initialization string for the Hayes Smartmodem 2400 will probably work with it. Chances are you'll never have to fool with the string, but if you do, remember that any command in your modem's manual can go in the string. Just make sure you don't splice one command into another; for example, don't add letters between the ampersand and the C in &C1.

Need an expert opinion? One Star Trek script writer submitted a physics question to SUNY and received 15 responses in two days.

Experts at Journalists' Fingertips

Q I'm a journalist researching a book. Can I use Internet to get in touch with academic experts who might help clarify some technical issues?
Dan Fowler, Old Bridge, New Jersey

A You're in luck. The State University of New York (SUNY) at Stony Brook helps journalists and other writers with their research through a service that's called ProfNet.

Here's how it works: Submit a query to the Office of News Services at SUNY, and it passes the query on to the information officers at more than 200 universities on Internet. There is no fee—and no guarantee that you'll get any responses. One writer I know, however, submitted a physics question for a script he was writing for *Star Trek: The Next Generation*. He received 15 responses in two days.

When you submit a query to ProfNet, you must specify the nature of your project, the kind of expertise that you're seeking, your time frame, and the manner in which you wish to receive responses. At the moment, ProfNet is available only to journalists and other writers and media professionals, but SUNY would like to expand its availability in the future.

Submit your queries to Internet at ProfNet@sunysb.edu, to CompuServe at 73163,1362, by phone at 800/776-3638, or by fax at 516/632-6313. You can also use MCI Mail: Address your message to **Daniel Forbush (EMS)**; at the EMS: prompt, type **Internet**; and at the MBX: prompt, type **ProfNet@sunysb.edu**.

Fast Connects Between PCs

Q I'd like to transport some large database files between two PCs. Is there some way that's faster than doing the floppy shuffle?
Anne Falck, San Bernardino, California

A Try Traveling Software's CommWorks for Windows. This integrated communications program, which includes modules for fax, regular data communications, and remote access, lets you shuttle files between PCs with speed and simplicity, thanks to a high-speed communications protocol and simple menus that make file transfers as easy as copying files between drives. The program comes with special cables for connecting PCs via their serial or parallel ports. A parallel port connection works the fastest.

If you're not a Windows user, try Traveling Software's LapLink V for DOS, which is included in CommWorks and is also available separately. It enables you to copy files with the same speed and simplicity, and it also comes with cables.

CommWorks costs $199.95; LapLink V is available separately for $169.95 from Traveling Software, 800/343-8080, 206/483-8088.

By Judy Heim

Judy Heim is a contributing editor for PC World *and the editor of* Online Investor, *a newsletter about using online services to track and manage investments.* Communications *welcomes your questions.* *See page 10 for contact information.*

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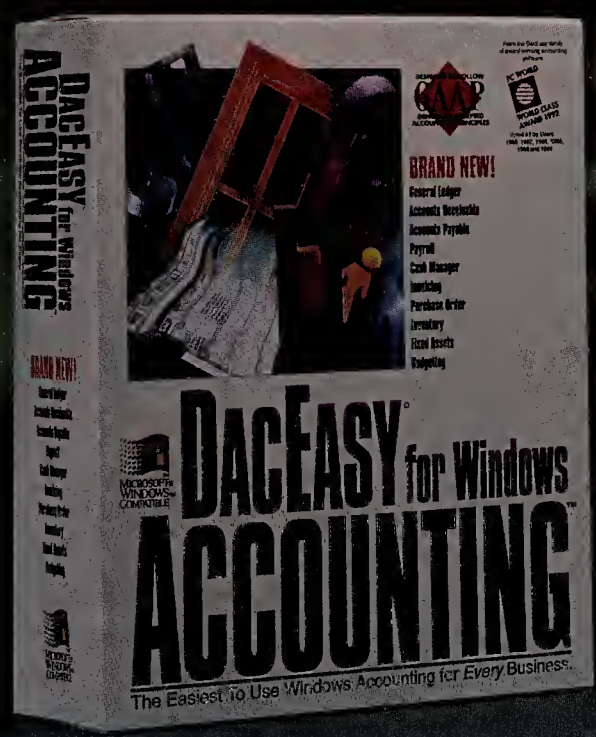

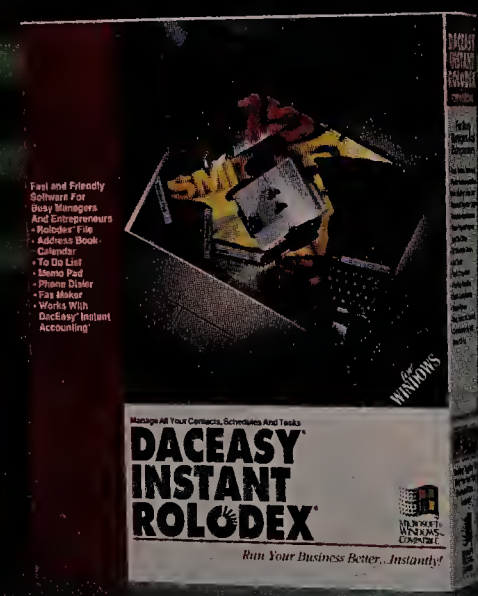

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Free Windows Software

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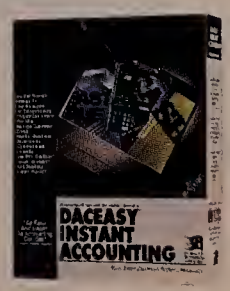

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Circle 94 on reader service card

HARDWARE Q & A

Pump Up That 386!

Q I need more power, but I don't want to trade my reliable 386 for a 486. Do clock doubler chips for 386s exist?
Wai Jung, Washington, D.C.

A While Intel offers clock doublers—officially known as OverDrive Processors—for 486SX and 486DX systems, the company hasn't developed clock doublers for 386s. But Cyrix, one of Intel's competitors, has done just that. Last June the company announced the Cx486DRx2 Upgrade Microprocessor, a clock doubling chip that works in most 386DX systems. The chip comes in three speeds: 16/32 MHz ($299), 20/40 MHz ($349), and 25/50 MHz ($399).

Cyrix's Upgrade Microprocessors should increase system performance by 30 to 70 percent, depending on the application.

If Intel's OverDrives are any guide, Cyrix's Upgrade Microprocessors should increase system performance by 30 to 70 percent depending on the application. As with OverDrives for 486DXs, to install an Upgrade Microprocessor, you simply remove the original 386 chip with a chip puller and plug in the upgrade. However, with the Cyrix solution, there's one extra step: You must install software that automatically turns on the Upgrade Microprocessor's 1K internal memory cache at system start-up. (While much smaller than the 8K internal cache boasted by Intel's 486 line, Cyrix's cache still helps speed processing of data and instructions.) The whole installation should take you only about 15 minutes.

Cyrix offers a 30-day, money-back guarantee that Upgrade Microprocessors will work in any 386DX system, except those from Memorex/Telex. A limited lifetime warranty and toll-free tech support are included in the price of all Upgrade Microprocessors.

Modems Inside and Out

Q Should I buy an external or an internal modem? The externals cost more, but is that the only difference?
Larry Farrell, Trenton

A Price is one strike against external modems. Strike two is that they take up desk space, whereas internals, because they're on expansion boards, have no footprint. On the plus side, externals have status lights to tell you how your communications session is going, and they're a snap to install—you just plug them into a free serial port (COM1 or COM2) using a serial cable. Go into your communications software setup, specify that same port, identify the modem's speed and type, and you're ready to roll.

By contrast, internals can be hard to install. Along with opening your system and physically seating the board, you may need to change the modem's serial port assignment. By default, internal modems almost always come configured for COM1. But if, say, a mouse is already attached to that port, you'll need to flip a switch or move a jumper on the board to change the modem's assignment to COM2. The modem's documentation will show you how to do this.

Whichever serial port the modem uses, you'll have to disable that same port in your system with your PC's setup routine. COM1 and COM2 will appear prominently on the setup routine's menu, and you should be able to disable either with a couple keystrokes.

If nothing else is using COM1, you can often simply disable that port, plug in the modem, configure your communications software, and start communicating. Unfortunately, even when you've gotten the COM port assignment right, you may still experience installation difficulties—conflicts that may occur when you add any expansion board. Check out the "Conflict Resolution" question in September's column for a full discussion of interrupt and I/O address problems and solutions.

Sound Solutions

Q I'm in search of a sound card for games and maybe for attaching "voice notes" to Windows documents. What should I look for?
John Maglie, Lawrence, Kansas

A The first thing you need to decide is, what kind of games? If you just want beefed-up audio for games you'll run from your hard drive, almost any sound card will do—just check the specs to make sure it can play the MIDI files these games generally use. Creative Labs' SoundBlaster Deluxe ($129.95), for example, would work fine; just hook up the card to a couple inexpensive speakers and you're rolling.

But if you want to play some of the hot new games on CD ROM, you need to consider several other factors. For one thing, if a CD ROM player isn't already installed in your machine, you'll want to buy a sound card that includes a CD ROM interface and save yourself a slot. Popular cards that fit this description include SoundBlaster 16 ($249.95), Media Vision's Pro Audio Spectrum 16 ($299), and ATI's Stereo F/X-CD ($199). Note that none of these cards work with all CD ROM drives, and you should call the manufacturer to ensure the board and the drive of your choice are compatible.

With CD-based games and music, you can really tell the difference in sound quality among cards. Sound cards generally have either a 44- or 22-KHz maximum *sampling rate*, which refers to the number of times per second a card takes a snapshot of an analog sound wave and converts it to digital data. Depending on the card, each sample is either 16 or 8 bits long. As you may have guessed, the more data per second, the better the sound—44-KHz, 16-bit stereo sound, for example, gives comparable quality to an audio CD.

There's An Easier Way To Expand Your Memory

If you've been struggling to get the most out of your PC's memory, there's an easier way. It's called NETROOM® — the award winning memory manager that uses the newest technologies to shatter memory barriers, giving you more memory and a faster system.

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CLOAKING™ — A BREAKTHROUGH IN MEMORY AND PERFORMANCE

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And since Cloaking operates in your computer's protected mode, it's ultra-reliable and virtually eliminates crashes.

Cloaking will also upgrade all your BIOSs to the latest, most powerful versions including ISA, EISA, VL-Bus, VGA, PS/2 Micro Channel and Laptop/APM, so it will enhance any 386/486/Pentium™ system.

And, our Cloaked BIOS includes built-in virus protection so you can relax, secure in the knowledge that your data is safe.

CRASH-PROOF

Despite its obvious power and versatility, you don't have to be an engineer to install NETROOM. In fact the installation procedure is so simple it's literally crash-proof!

All you do is type in one command and choose your level of customization – *Conservative* for basic memory management, *Aggressive* for optimal management, and for those of us who have to have it OUR way, there's even a *Custom* mode available.

No matter which you choose, NETROOM will automatically take over from there and create the optimal memory configuration for maximum performance whether you're working in Windows or DOS.

And, our *Customize* program will automatically continue the customization process even if you "warm boot" or turn off your system in the middle.

In short, NETROOM isn't only crash-proof, it's also goof-proof!

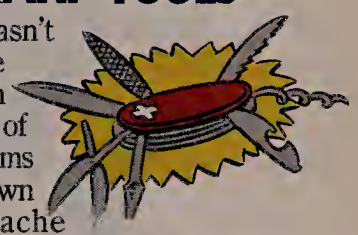
SCOREBOARD

Comparing memory managers	Helix Software Netroom 3.02	Qualitas Inc. 386Max 7.0	Quarterdeck Office Systems QEMM 7.01
PCWEEKLABS Overall score	4.5	3.6	4.0
Ability to reclaim memory below 1M byte (60%)	4.5	3.5	4.0
Ease of setup and configuration (25%)	4.0	3.5	3.5
Variety of memory APIs (15%)	5.0	4.0	4.5

Ratings Legend: 1 = Poor; 2 = Unremarkable; 3 = Meets Expectations; 4 = Better Than Expected; 5 = Outstanding

PC WEEK – July 26, 1993

SOME PRETTY SHARP TOOLS



As if having NETROOM wasn't handy enough, we've also included with it a full range of utility programs like our own Disk Cache which is faster than DOS's SmartDrive but uses only 5K; a graphical Windows and DOS screen saver, and an accelerator which speeds up DOS text screens by up to 20X!

Combine that with our ultra fast RAM drive, virus protection and the fact that *all* these utilities run in our exclusive Cloaked mode and you can see why NETROOM is the sharpest choice in memory managers!

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- Relocates SHELL and Stacks
- Manages self-loading TSRs
- Network Remote installation
- Special network loaders
- Support for DOS 6 Multi-config
- Support for all disk compression
- ROM "hole" scan
- Stack overflow protection
- Frame extender for larger TSRs
- Supports up to 256Mb of RAM
- Shadowing and De-Shadowing
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- Flexible multi-user licensing

If you're ready to expand your memory *and* performance without expanding your budget, the only thing you should be pumping into your computer is NETROOM!

SYSTEM REQUIREMENTS: Netroom operates with any 386 or 486 system with at least 1Mb of RAM. Limited support for 286/Neat systems is provided but does not include "Cloaking". For Windows support Netroom requires Windows 3.1 or later (WFW is supported). Microsoft Windows is a trademark of Microsoft Corp.

> *"NETROOM is the tops among memory managers"*
> — PC WEEK, PC WEEK LABS
> July 26, 1993

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Circle 90 on reader service card

The difference between 16-bit and 8-bit sound is noticeable, especially when you're playing or recording music.

On the other hand, when you embellish documents with voice notes (objects that play back audio messages when you click on them), you can make do with minimal fidelity. This is worth knowing, since some cards, such as ATI's Stereo F/X-CD, offer 44-KHz stereo playback but top out at 22 KHz when recording in stereo. In fact, you'll probably want to throttle back to fairly crude mono recording for voice, since sound takes up so much disk space. The 8-bit, 22-KHz maximum the ATI card delivers, for example, eats up more than 350K per second. Slash that to 11-KHz, 8-bit mono, and with voice you'll be hard pressed to tell the difference. Further, you'll use one-fourth the disk space (most people opt for even lower fidelity). Virtually every sound card gives you a choice of several lower-quality recording rates, along with compression schemes that squeeze sound files into as little as one-fourth the space without much loss in quality.

Compatibility with the most popular card, SoundBlaster, is another key factor if you'll be playing games. Even Microsoft's businesslike Windows Sound System ($289), which lacks a CD interface, recently added SoundBlaster compatibility via a software upgrade. Combine this compatibility with the capability to play MIDI files and you'll get great sound out of just about any DOS game that talks to a sound card.

Likewise, Windows 3.1 compatibility ensures that your card will work with all Windows games—and that you can embed voice notes in Windows files. Any Windows app with an Insert•Object option lets you paste microphone icons in documents using 3.1's sound-object-embedding software. Windows' native sound editing and embedding capabilities are pretty primitive, however; the software bundled with Windows Sound System, SoundBlaster 16, and Media Vision's Pro Audio Studio 16 ($349) makes the process much more enjoyable. All three of these cards also come with microphones and 44-KHz, 16-bit stereo fidelity.

Be advised that installing a sound card can be tricky. The Pro Audio Studio 16, for example, takes two interrupts and two I/O addresses if you enable SoundBlaster compatibility, which could easily cause conflicts in a system already crowded with cards. Fortunately, all the cards I've mentioned come with software to help you configure them correctly and avoid problems (again, see September's column for more on interrupt and I/O conflicts). One rule of thumb: If a card gives you the option to disable Direct Memory Access (DMA), don't do it. Access to a DMA channel enables big chunks of data to pass between board and disk without CPU intervention, ensuring uninterrupted sound. All AT-class PCs and above have seven DMA channels, so if there's a conflict, make sure you use diagnostic software to identify free channels and configure the card to grab one—there are plenty to go around.

By Eric Knorr

Eric Knorr is a contributing editor for PC World. Hardware *welcomes your questions.* *See page 10 for contact information.*

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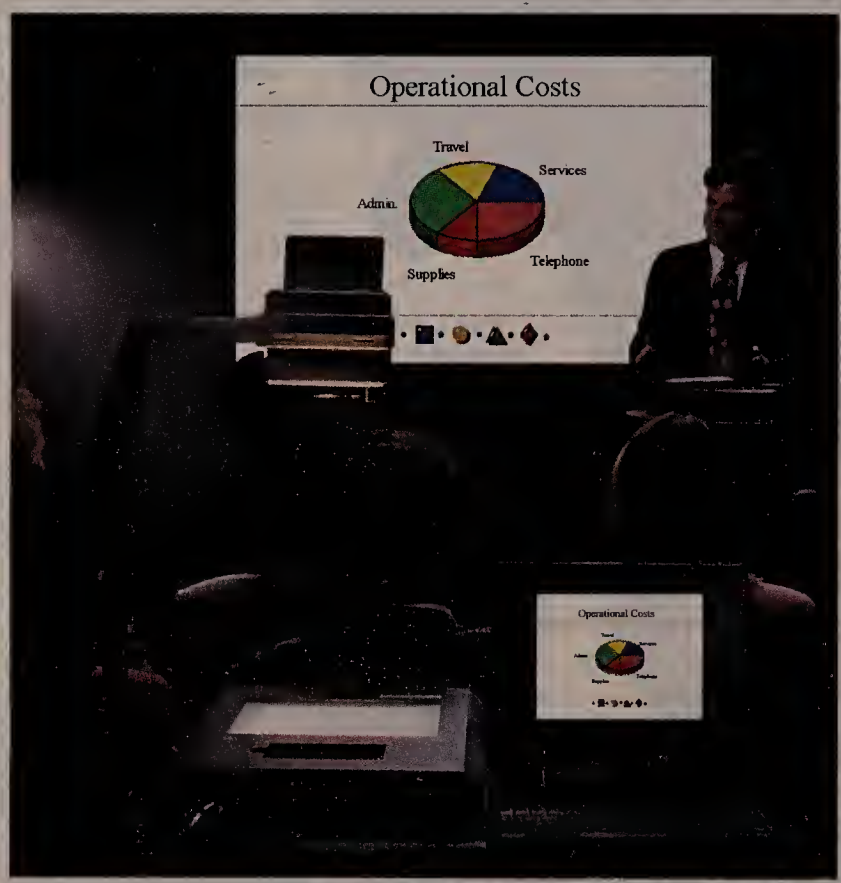

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back
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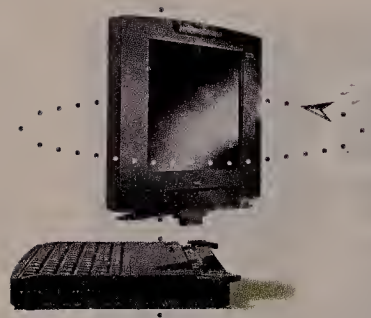
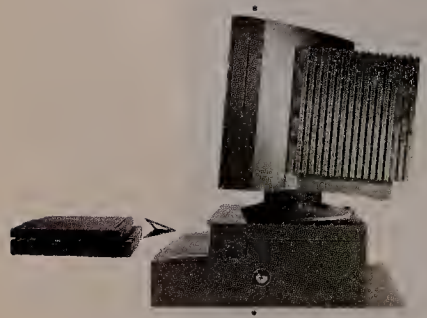


Or flips around in just seconds.



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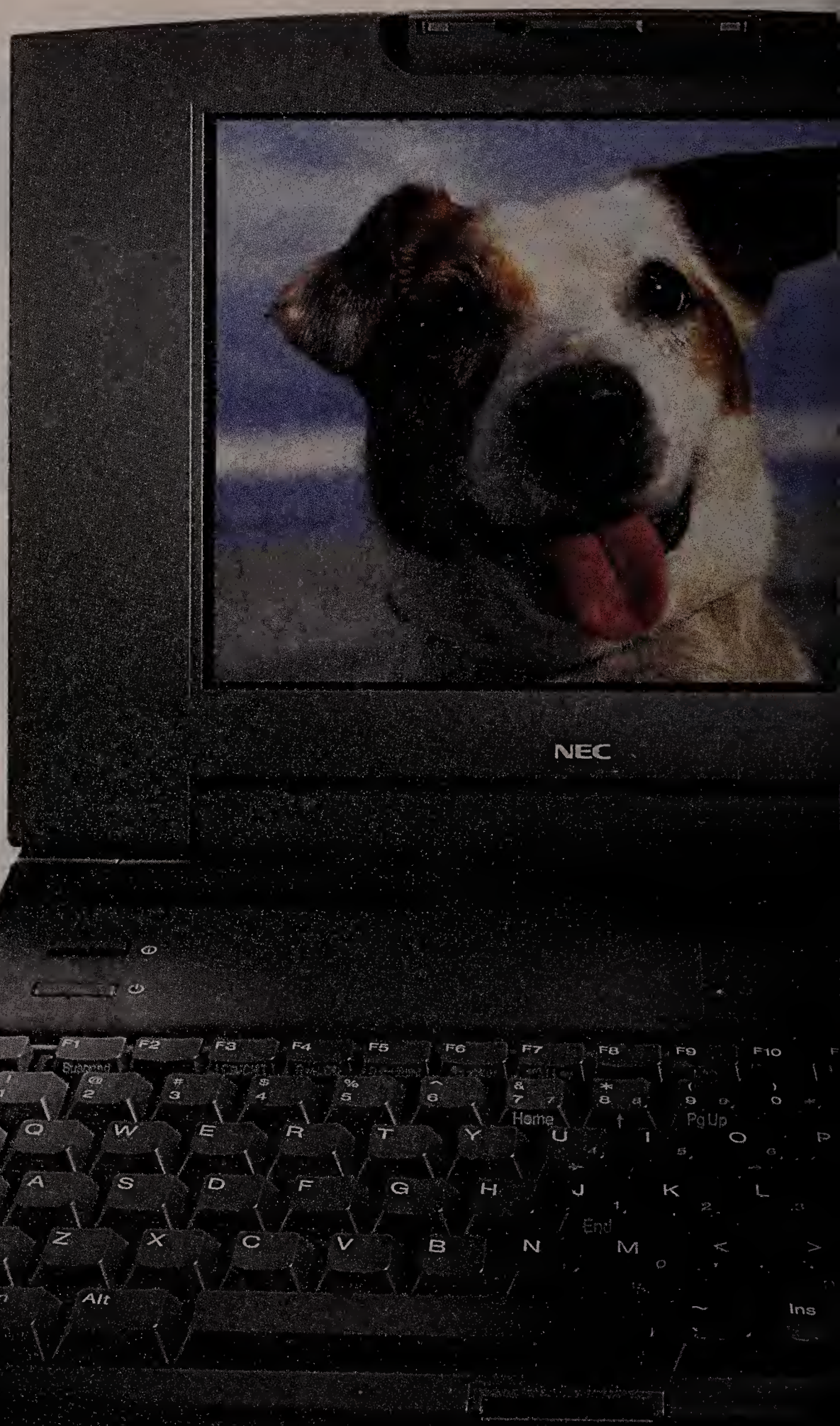

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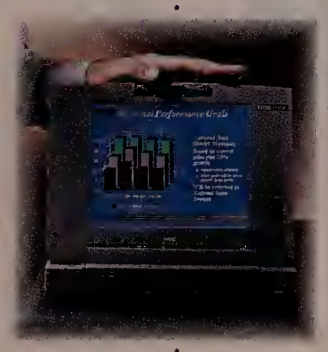
Versa functions as a pen-based tablet to enter notes or data.



The reversible screen makes presentations a snap.

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Circle 203 on reader service card

STAR-DOT-STAR TIPS

Word in Reverse

Microsoft Word for Windows has no documented method for creating reversed (white-on-black) text, but I've discovered a way. Select the text you would like to reverse, then choose *Format•Character* from the menu. In the Color list box, select *White*, then click *OK*. Choose *Format•Border*, click *Shading*, select *Black* in the Background list box, then click *OK* twice to return to the document. Or you can use a short macro as shown in **FIGURE 1** to reverse the text you've selected.

Bryan Davis, Clanton, Alabama

Editor's note: When I received this tip, I was certain that an idea this useful must have turned up many times in articles featuring Word for Windows tips. But I couldn't find a mention of this technique anywhere, until I talked to *PC World* Contributing Editor George Campbell. Turns out reader Mark Paciga sent in a similar technique (minus the macro) to this month's *Word Processing* column, but he was having trouble making his reversed type print legibly on a LaserJet. For Campbell's advice on getting a sharp reversed-type printout, see *Word Processing Q&A* ("Reversed Printing in WinWord"). Meanwhile, there are a few things you should know before using this method to generate reversed text. First, since the Format•Border command works only on whole paragraphs, you must reverse all the text within a paragraph. (Characters you leave formatted black will display and print black on black—they will simply disappear.)

Second, when you manually execute the two commands, the still-selected text won't appear reversed until you click on some other area of the screen, canceling the selection. Finally, since this is a two-step process, the Edit•Undo command will undo only half your handiwork, leaving you with a white-on-white paragraph. You may want to create a second macro to undo the process in one step using Word for Windows' macro recorder.

I've added commands to Davis's macro to handle the first two details. The version of the macro printed here always reverses the entire paragraph around the selection point. It also moves to the next paragraph, canceling the selection after it's finished. In my copy of Word for Windows, I've named this macro Invert Paragraph and have used the Keyboard section of the Tools•Options dialog box to assign it the key combination <Ctrl>-<Shift>-I.

If you don't want to type this macro yourself, download INVERT.TXT from the Featured in November area of PC World Online and paste it into Word for Windows' macro editor.

```
Sub MAIN

ParaUp(1, 0)
ParaDown(1, 1)
FormatCharacter .Color = 8
FormatBorder .Background = 1
ParaDown(1, 0)
End Sub
```

FIGURE 1: CHANGE THE CURRENT PARAGRAPH'S text to white on black with this WinWord macro.

FINDers Keepers

One of the DOS batch language's weakest points is its limited capability to detect, and make decisions based on, the results of DOS commands. Here's a useful technique that lets a DOS batch file perform different actions depending on either the outcome of a command or the contents of a file.

As you may know, DOS's FIND command searches files and output piped from other commands for a specified string. Normally, FIND displays the name of the file being searched, followed by the lines in which the search text appeared. However, if you redirect a file into FIND instead of specifying its name as an argument, FIND omits the file name from its output. And if you invoke FIND with the /C command line switch, FIND returns only the *number* of lines in which the string was found. Thus, the command FIND/C "*text*" < README.DOC will yield a single number: the number of lines in which "*text*" was found in the file README.DOC. (If the text isn't found, the number is 0.)

This aspeet of the FIND command lets you perform a useful trick. Suppose you create batch files with the names 0.BAT, 1.BAT, 2.BAT, and so on—one for each number of occurrences the FIND command might count. Then you can use the commands FIND/C "*text*" < *filename* > BRANCH.BAT and CALL BRANCH to execute a different batch file for each number of occurrences FIND might report. In most situations—for instance, when you want to find out if a command completed successfully—you'll need only two numbered batch files: 0.BAT and 1.BAT. CHKIPX.BAT in **FIGURE 2** demonstrates this (be sure that you use zeros and not uppercase letter O's). It uses the output of the MEM command to test whether or not NetWare's IPX

```
@echo off
c:
cd \
rem ** Construct batch files
echo @echo IPX is not loaded! > 0.bat
echo @echo IPX is loaded! > 1.bat
rem ** Check mem's output
mem /c | find /c "IPX" > branch.bat

rem ** Run appropriate batch file
call branch
rem ** clean up **
del 0.bat > nul
del 1.bat > nul
del branch.bat > nul
```

FIGURE 2: IS THAT TSR LOADED? CHKIPX.BAT action depends on whether NetWare's IPX driver is loaded.

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TurboModem Plus. Slow and steady isn't always the best solution. In today's business world you need the fastest Fax/Modem available to stay ahead of your competition.

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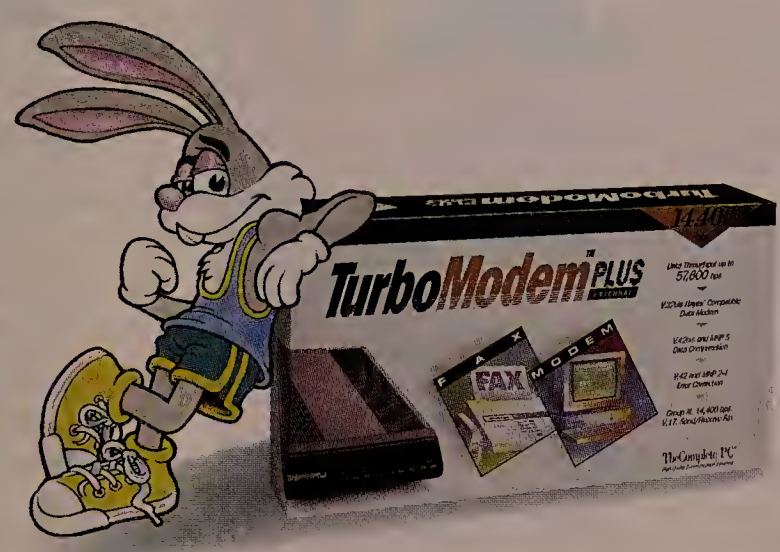
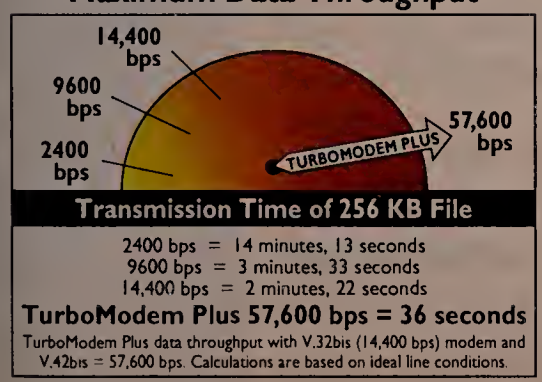


Maximum Data Throughput



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network driver is loaded and takes different actions depending on the result. (You can use this technique to test whether or not any TSR is loaded, as long as it shows up in MEM's report.)

CHKIPX.BAT creates the files 0.BAT and 1.BAT on the fly and deletes them when it's finished, but these two files could also have been constructed in advance and stored on disk. CHKIPX.BAT illustrates that one batch file can invoke another with or without the CALL command. Because CHKIPX.BAT uses the CALL command to invoke BRANCH.BAT, it will regain control after BRANCH.BAT (or any batch file invoked by BRANCH.BAT) finishes running. But BRANCH.BAT invokes 0.BAT or 1.BAT without a call. This means that when the numbered batch file is done, control does *not* return to BRANCH.BAT (which would cause DOS to ignore the remaining commands in CHKIPX.BAT). Instead, processing resumes with the next line of CHKIPX.BAT, which cleans up by erasing BRANCH.BAT along with all other temporary files.

Mark Mikula, Park Forest, Illinois

Editor's note: This use of the FIND command is a great way to test for the presence of text in a file. It's also essential when a batch file needs to test the success of a command that does not set ERRORLEVEL.

```
lcs:100 2 0 1
na:\bootrec.org
rcx
200
wcs:100
q
```

FIGURE 3: THE GETBOOT.SCR DEBUG SCRIPT saves your hard disk's original boot sector in a floppy disk file.

```
lcs:100 2 0 1
nc:\bootrec.chk
rcx
200
wcs:100
q
```

FIGURE 4: THE CHKBOOT.SCR DEBUG SCRIPT saves your hard disk's current boot sector so you can compare it to the original.

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```
@echo off
c:
cd \
echo @echo ^G^G^G Master boot sector has been altered! > c:\0.bat
echo @echo Master boot sector matches original > c:\1.bat
a:\debug < a:\chkboot.scr
a:\fc /b a:\bootrec.org c:\bootrec.chk | a:\find /c "no differences" >
c:\tmp.bat
call c:\tmp.bat
del c:\tmp.bat
del c:\0.bat
del c:\1.bat
```

FIGURE 5: CHKBOOT.BAT COMPARES YOUR HARD DISK'S CURRENT BOOT SECTOR with a copy of the original to check for changes, that may indicate a virus has infected your system.

However, if you use this technique in conjunction with the MEM command to test whether TSRs are loaded, be warned: Some TSRs, such as Norton's NCache, use several blocks of memory, which causes their names to appear more than once in MEM's output. If they do, create numbered batch files to handle the numbers of occurrences FIND might detect—for instance, 0.BAT and 3.BAT. And remember that FIND is case-sensitive (unless you include its /I switch), so make sure you get all the capital and lowercase letters just right. If you want to use CHKIPX.BAT as a starting point from your own files, you can download it from the Featured in November folder on PC World Online.

System Savior

Some nasty viruses, such as Michelangelo and Stoned, infect your system by invading the *master boot record*—the first sector of a disk. Here's a technique that will detect changes to your hard disk's boot record and restore the original if you discover an infection. Before a virus strikes, copy the DEBUG script GETBOOT.SCR (**FIGURE 3**) into the root directory of a bootable floppy disk in your A: drive using any text editor. (If you're using DOS's EDIT you can insert the ^G's—which beep the speaker—in **FIGURE 5** by pressing **<Ctrl>-P** and then **<Ctrl>-G** for each one. Also be sure you use zeros and not uppercase O's.) Also copy DOS's DEBUG.EXE, FC.EXE (file compare), and FIND.EXE programs (usually stored in the DOS directory) to the floppy. Make the floppy the current drive and execute the script by entering the commands **A:** and **DEBUG <GETBOOT.SCR** at the DOS prompt. The file BOOTREC.ORG appears in the floppy disk's root directory.

Next, create the DEBUG script CHKBOOT.SCR (**FIGURE 4**). To save time, copy A:\GETBOOT.SCR to A:\CHKBOOT.SCR and change the file name on the second line using a text editor; the files are otherwise identical. Finally, copy the files CHKBOOT.BAT (**FIGURE 5**), CHKBOOT.SCR, and BOOTSAFE.SCR (**FIGURE 6**) to the root directory of the floppy, then write-protect it. Since the files are short, this should only take a few minutes.

Anytime you wish to check your boot record's integrity, turn the computer off (don't just press <Ctrl>-<Alt>-<Delete>) and reboot from the floppy. Then, run CHKBOOT.BAT, which will use the DEBUG script CHKBOOT.SCR to get a copy of your current boot record and compare it to your earlier copy.

If the batch file responds with the error message 'Master boot record has been altered!', it's time to take quick action. Issue the command **A:\DEBUG A:\BOOTREC.ORG < BOOTSAFE.SCR**, then remove the floppy disk from the system and reboot again. This will restore your original boot record, which will not have been infected by the virus.

Paul Kimmel, Okemos, Michigan

Editor's note: It's always a good idea to save a copy of your system's boot record—

```
wcs:100 2 0 1
q
```

FIGURE 6: BOOTSAFE.SCR restores your boot record from the clean copy on a floppy disk.

SER-SOUND 486DX
NOTEBOOK PC

MODEL NO. SER-SOUND

Microprocessor:
* CPU i80486™DX-33
33MHz operating speed

Weight:
* 5.5 LBS (2.5kgs) including battery & HDD

Options:
Build-in trackball
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* External PS/2 mouse
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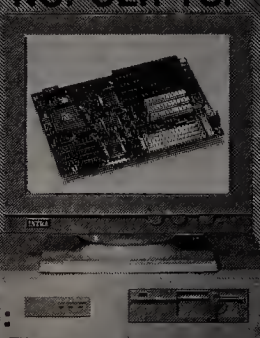
i80486™DX
SYSTEM
MODEL NO. SER-TCI



* CPU:
i80486™DX-33
* Chipset:
Intel SATURN-82420/82430 PCIchipset
* Cache Memory:
256/512KB cache memory
* Memory:
4MB on board expandable to 36MB
* BIOS:
PHOENIX BIOS
* Expansion Slots:
Three PCI slots, Five ISA slots
* PCI-Base SCSI Controller:
NCR 53c810 master device

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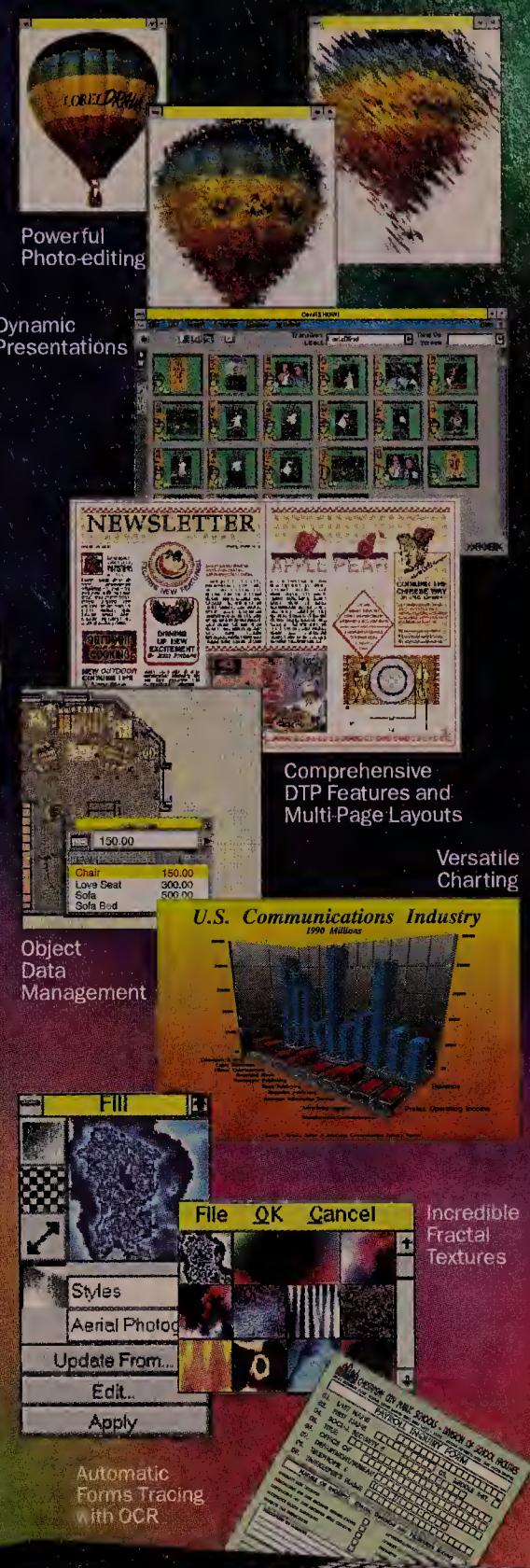

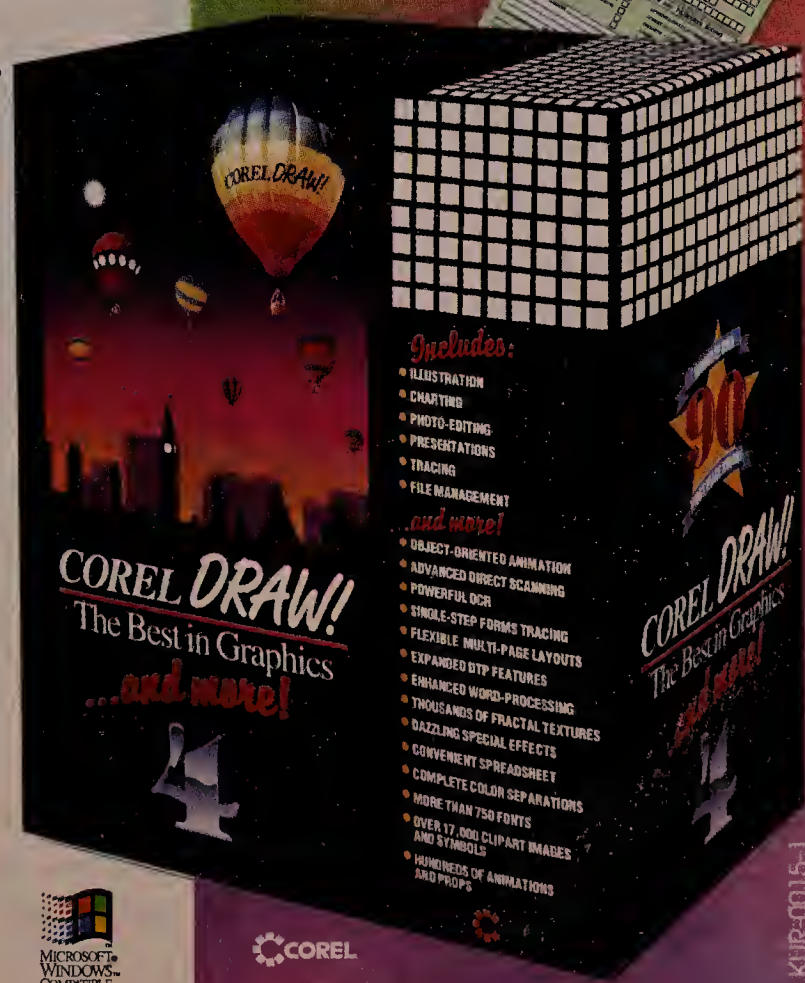

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in case it's corrupted by an errant program or infected by a virus. Some boot record viruses—such as the infamous Happy Birthday Joshi virus—are able to hide if you boot from an infected disk. Therefore, it's vital to boot from a virus-free, write-protected floppy when testing for the virus and/or restoring your boot record. Also remember to update your copy of the boot record every time you upgrade DOS, repartition your disk with DOS's FDISK utility, or install or remove a disk-compression utility such as DoubleSpace. Finally, you may notice that I've borrowed the FIND /C trick from the previous tip to streamline CHKBOOT.BAT's operation. The files CHKIPX.BAT, GETBOOT.SCR, CHKBOOT.SCR, and CHKBOOT.BAT are all available in the Featured in November folder on PC World Online.

Expanding SmartDrive

If your machine has little extended memory (many older systems have only 384K, some of which may be used to shadow your ROMs), or is based on the 8088 or 8086, DOS 6.0's SmartDrive may not work on your computer. Instead, it will return an error message: 'There is insufficient XMS memory to load SmartDrive.' This wasn't a problem in DOS 5.0, which allowed you to load SmartDrive into *expanded* (LIM/EMS) memory using the /A switch. However, you can use DOS 5.0's SmartDrive with DOS 6.0 if you issue the command **SETVER C:\DOS SMARTDRV.SYS 5.0** at the DOS prompt and add the line **DEVICE=C:\DOS5\SMARTDRV.SYS 1536 /A** to your CONFIG.SYS file. Create a separate directory called C:\DOS5 for DOS 5.0 utilities, rather than copying them over the DOS 6.0 utilities in C:\DOS, and have at least 1.5MB of expanded memory available. The /A switch tells the older version of SmartDrive to use expanded, rather than extended, memory.

Adrian Dieleman, Waupun, Wisconsin

Editor's note: I've used this technique myself to help users who have trouble with the latest version of SmartDrive or are concerned that it may cause some of the disk corruption problems reported in DOS 6.0.

By Brett Glass

Brett Glass is a contributing editor for PC World. Star-Dot-Star *welcomes your questions. See page 10 for contact information.*

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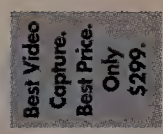

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Enhanced editor	x	
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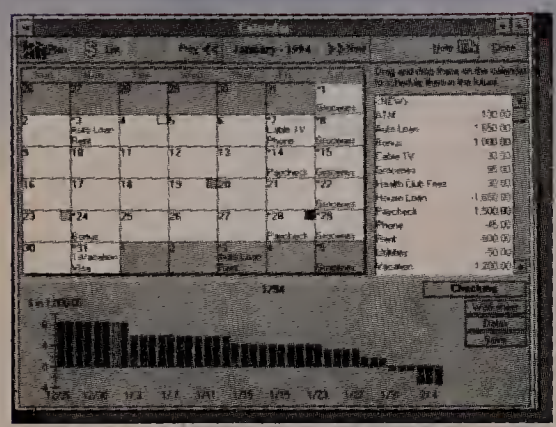

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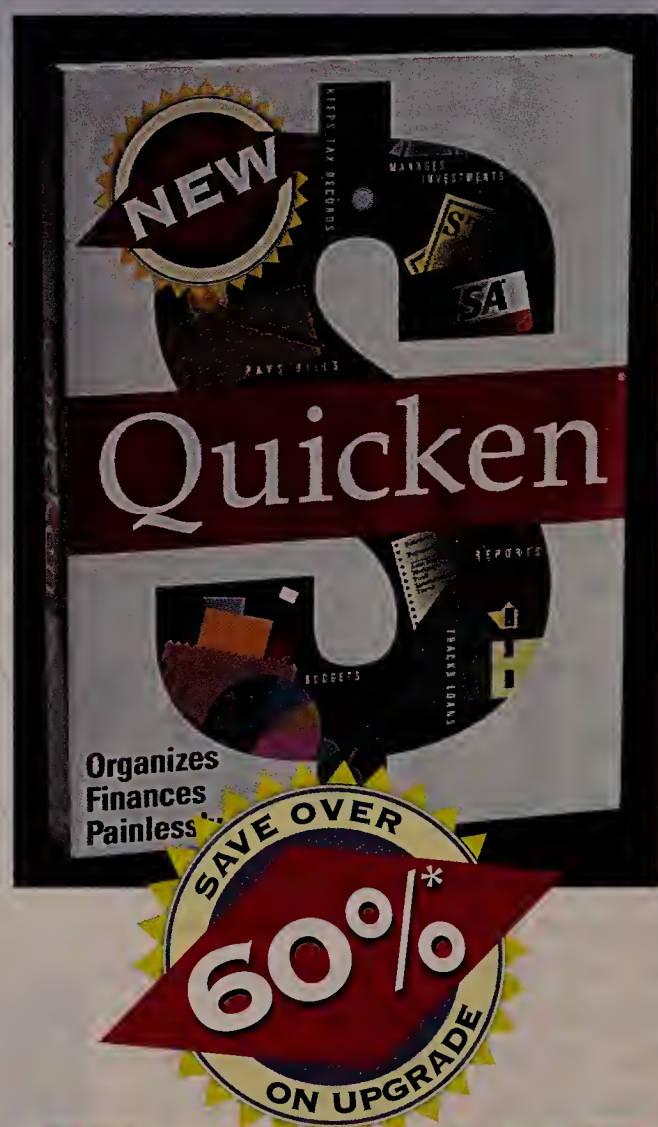

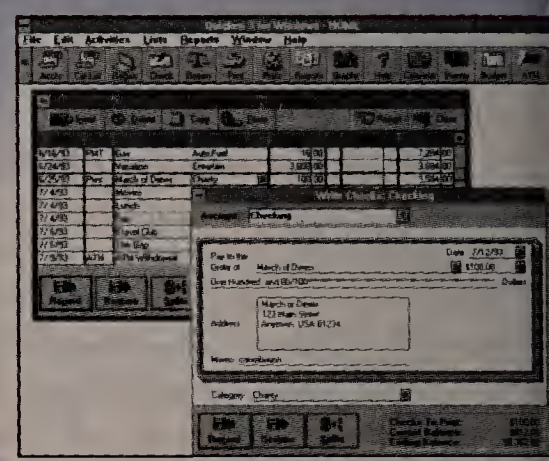

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Model _____

Price $_____

Dealer/salesperson _____

Phone number_____ / _____ — _____

Address_____

_____

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Type Notebook Portable Small desktop Full desktop Minitower Miditower Full tower Other_____

System power switch location Front Side Rear

Wattage_____ **220-volt option** Yes No

Power outlet for monitor Yes No

Drive bays	Internal		Externally accessible	
	Total	Free	Total	Free
5¼-inch				
3½-inch				

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MOTHERBOARD

CPU

Manufacturer Intel AMD Cyrix Other_____

Name/model_____ **Clock speed (MHz)** _____

Upgrade via OverDrive for SX or DX Pentium OverDrive Plug-in CPU card Other_____

Zero insertion force socket Yes No

Accepts Weitek coprocessor Yes No

SYSTEM MEMORY

Form SIMM Proprietary SIMM Other_____

Type(s) supported 512K 1MB 2MB 4MB 8MB 16MB

	MB	Number of SIMM slots
Installed		
Maximum		

CACHE MEMORY

Installed (K) 0 64 128 256

Maximum (K) 0 64 128 256

Cost of upgrade to maximum $_____

Type Four-way set associative Write back Two-way set associative Write through Direct mapped Other_____

Expansion slots	ISA		EISA		MCA		VESA		PCI	
	Total	Free	Total	Free	Total	Free	Total	Free	Total	Free
8-bit										
16-bit										
32-bit										

BIOS

Developer AMI Award Phoenix Other_____

Version _____

PORTS

Number of ____Serial ____Parallel ____SCSI ____Keyboard ____Mouse ____Ethernet

STORAGE

FLOPPY DRIVES

Number of _____5¼-inch (1.2MB) _____3½-inch (2.88MB) _____3½-inch (1.44MB) _____5¼-/3½-inch combo

HARD DRIVE

Manufacturer_____

Model_____ **Capacity (MB)** _____

Width 5¼-inch 3½-inch

Height ⅓-height ½-height Full-height

Access time (ms)_____ **Transfer rate (MB/second)**_____

Rotation speed (rpm) 3600 4500

Interface standard IDE SCSI ESDI

Interface form Plug-in adapter Integrated

Caching controller Yes No

Cache size Installed (MB)_____ Maximum (MB)_____

VIDEO

MONITOR

Manufacturer_____

Model_____ **Size (diagonal inches)**_____

Color Yes No **Dot/stripe pitch (mm)**_____

Front-mounted power switch Yes No

Front-mounted controls Yes No

Multiscan Yes No **Low emission** Yes No

Resolutions	VGA	800 x 600	1024 x 768	1280 x 1024
Supported (Y/N)				
Refresh rate (Hz)				
Interlaced (Y/N)				

CONTROLLER

Manufacturer_____

Model _____

Form Plug-in adapter Integrated

Uses local bus Yes No

Graphics accelerator Yes No

	Installed	Maximum	Cost of upgrade to maximum
DRAM			$
VRAM			$

Resolutions	VGA	800 x 600	1024 x 768	1280 x 1024
Supported (Y/N)				
Maximum colors				
RAM required				

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Number of keys 101 ___

Inverted-T cursor keys Yes No

Numeric keypad Yes No

Number of function keys 10 12 15 ____

Function key location Top Left side

MOUSE OR TRACKBALL

Manufacturer_____

Model _____

Type Serial Bus **Number of buttons** 2 3

Software included_____

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Model _____

Interface SCSI 34-pin

Form Internal External

Access time (ms)____ **Transfer rate (MB/second)** ____

PRINTER

Manufacturer_____

Model _____

Type Laser Ink jet 9-pin dot matrix 24-pin dot matrix

Color Yes No **Resolution (dpi)**____

Languages supported PCL PostScript Other____

Number of scalable fonts____ **Number of bit-mapped fonts**____

Interface Serial Parallel **Cable included** Yes No

Speed (ppm)____

Installed RAM (MB)____ **Maximum RAM (MB)**____

Paper capacity (sheets)____ **Feed** Bottom Tractor Front

Envelope feeder Yes No **Paper parking** Yes No

Paper sizes supported 8½ x 11 Legal A4 Other____

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Model _____

Fax software program_____

Fax protocol Class 1 Class 2 CAS

Fax send/receive speed (bps)____ /____

Modem speed (bps) 2400 9600 14,400

Error correction protocol MNP 4 MNP 10 V.42 Other____

Data compression protocol MNP 5 MNP 7 V.42bis Other____

SOUND CARD

Manufacturer_____

Model _____

Form 8-bit 16-bit

Speakers Yes No Model____

SERVICE AND SUPPORT

Type of outlet Mail order Independent Franchise Superstore Manufacturer's dealer

Fold Here

If not independent, how many other outlets____

Size of outlet Small Medium Large **Years in business**____

Sales staff Attentive Patient Helpful Knowledgeable

MAIL-ORDER OR DEALER WARRANTY/GUARANTEE

Warranty (months) 6 12 18 24 36 Other____

Covers parts Yes No **Covers labor** Yes No

30-day money-back guarantee Yes No

MAIL-ORDER TECHNICAL SUPPORT

Price $____ **Term (months)**____

Weekday hours____–____ **Toll-free** Yes No

Weekend hours____–____

BBS support Yes No **Fax support** Yes No

MAIL-ORDER REPAIR SERVICE

Price $____ **Term (months)**____

Turnaround policy (days)____ **Manufacturer pays shipping** Yes No

On-site service Yes No **Price of on-site policy** $____

DEALER TECHNICAL SUPPORT

Price $____ **Term (months)**____

Weekday hours____–____ **Toll-free** Yes No

Weekend hours____–____

Phone support Yes No **Dedicated line** Yes No

Dedicated support staff Yes No **Size of staff**____

Support staff trained by manufacturer Yes No

DEALER REPAIR SERVICE

Repairs done in-house Yes No **Dealer stocks parts** Yes No

Turnaround policy (days) ____

On-site service Yes No **Price of on-site policy** $ ____

Other support options____

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Do you use Windows 3.1?* ❑ Yes ❑ No

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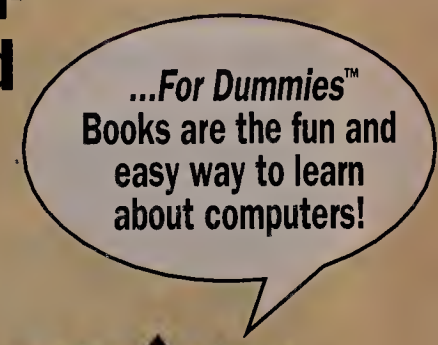

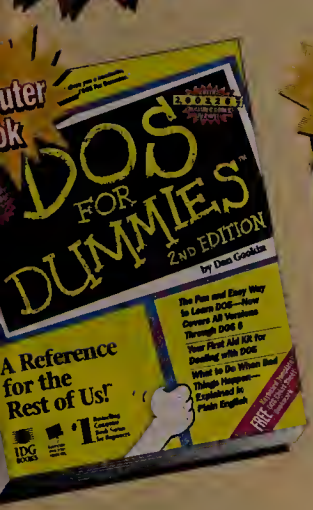

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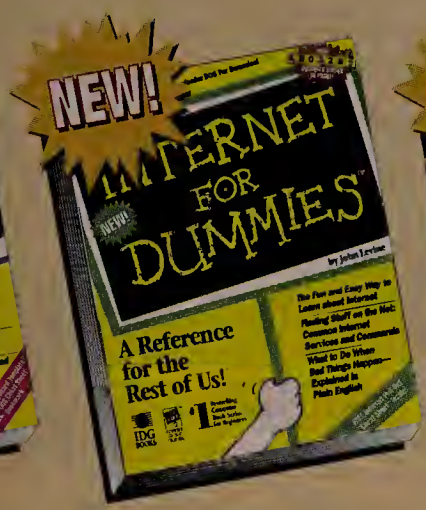

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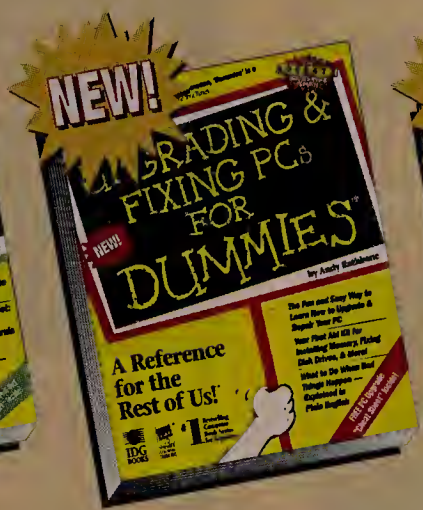

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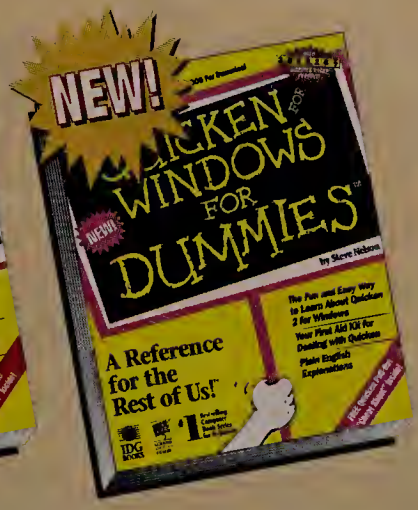

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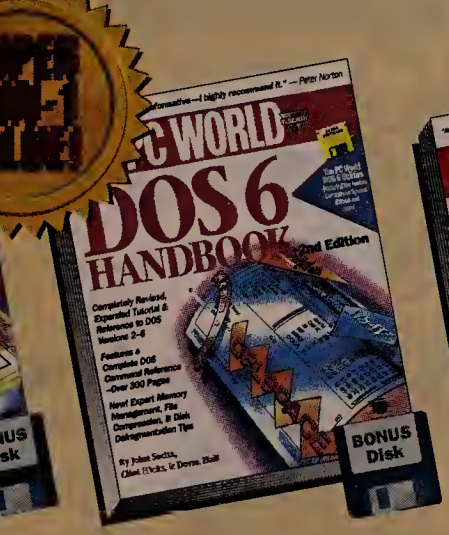

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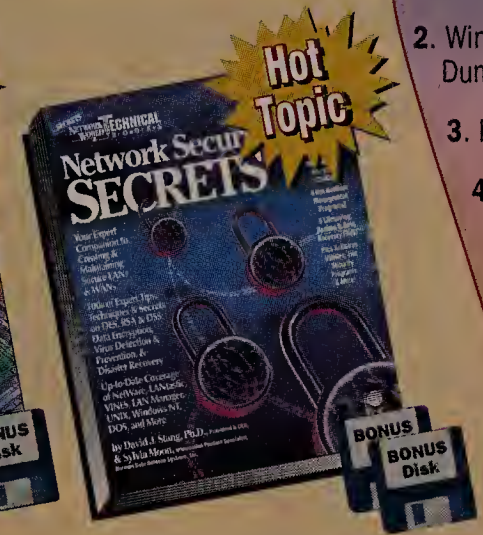

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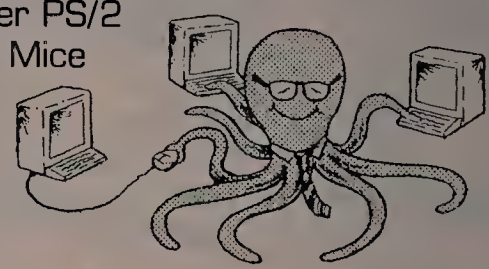

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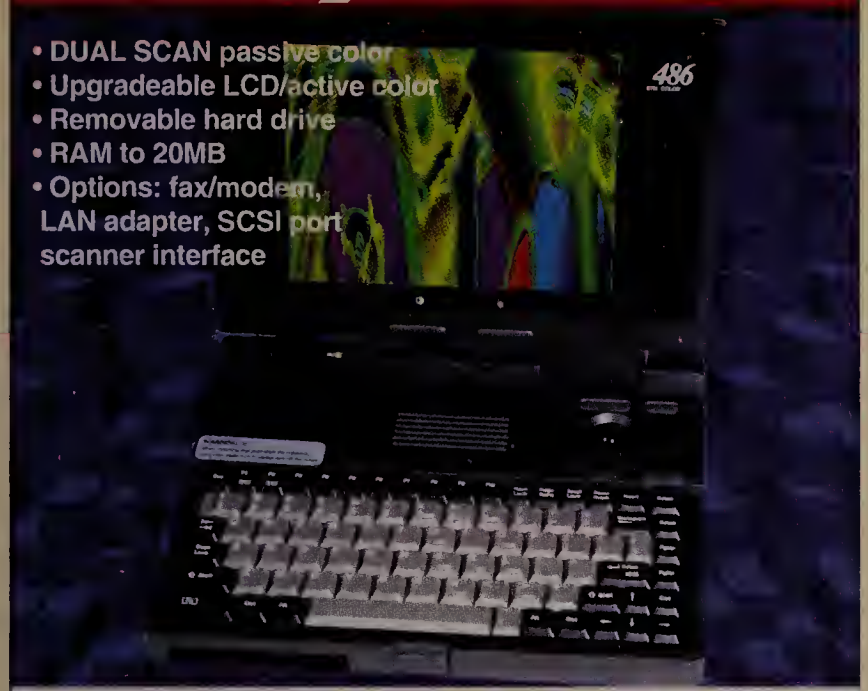

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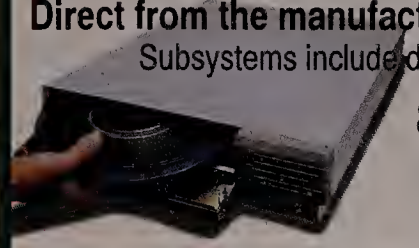

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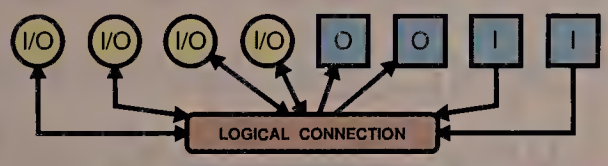

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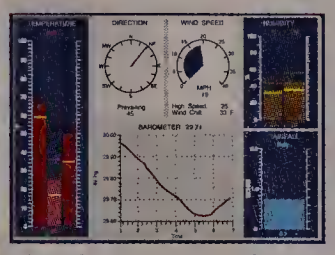

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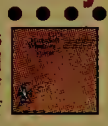

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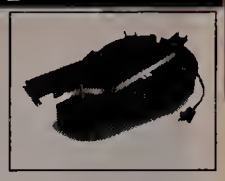

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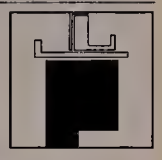

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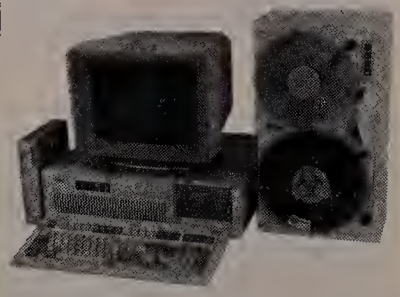

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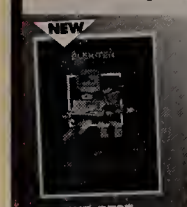

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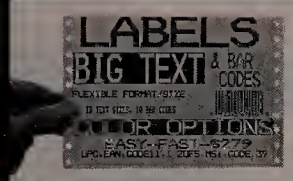

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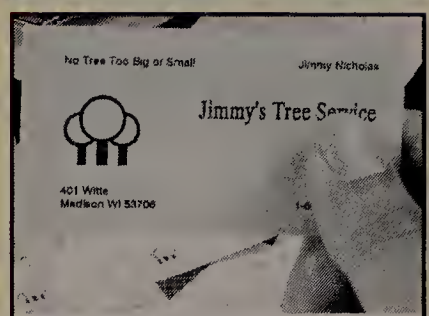

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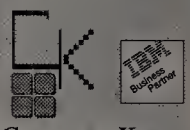

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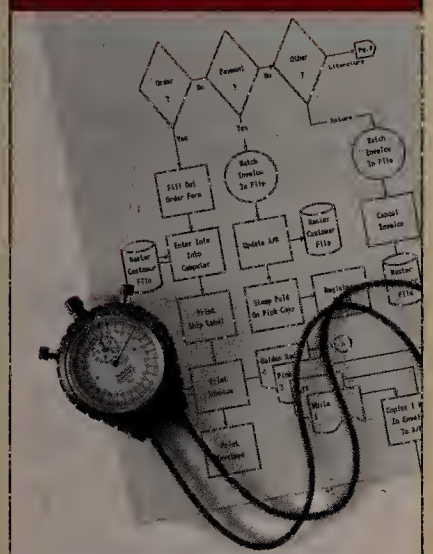

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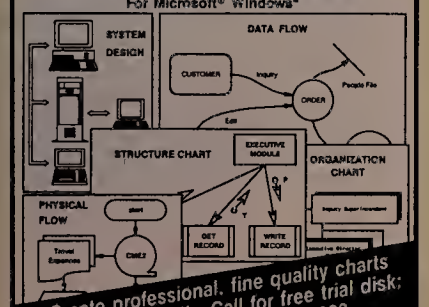

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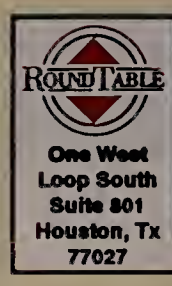

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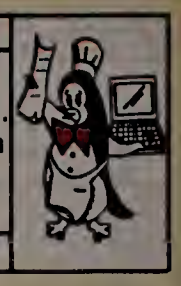

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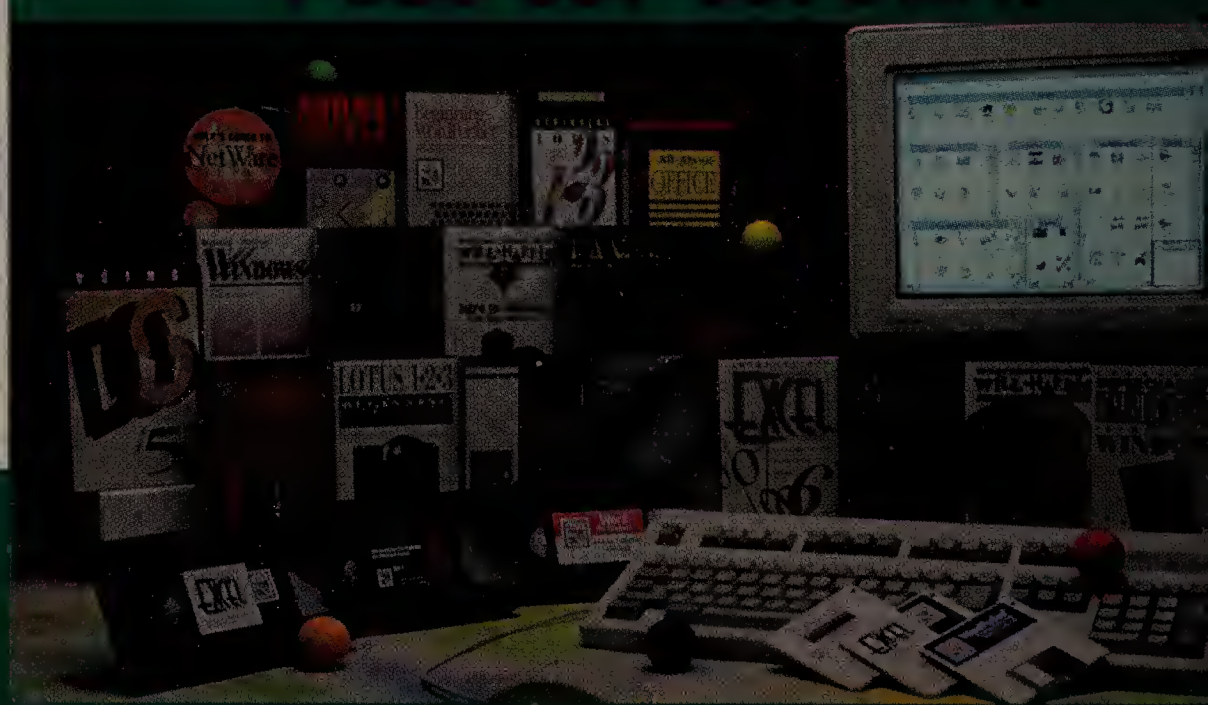

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Circle 240 on reader service card

Software Training Videos

HARD DRIVES MEMORY SUPER SOURCE

LIFETIME* WARRANTY 100% GUARANTEED

EXTENAL DRIVES ADD $149.

Quantum

FACTORY NEW - 2 YEAR WARRANTY ELS & LPS
5 YEAR WARRANTY ON P DRIVES
1 YEAR WARRANTY ON 2 5' DRIVES

CAPACITY M/N	SPEED	SIZE	PRICE
IDE			
80MB NOTEBOOK	16MS	2 5'	$259
120MB NOTEBOOK	16MS	2 5	329
160MB NOTEBOOK	16MS	2 5'	459
85MB ELS85A	17MS	3 5X1'	169
127MB ELS127A	17MS	3 5X1	168
170MB ELS170A	17MS	3 5X1'	197
240MB LPS240A	16MS	3 5X1'	259
525MB LPS525AT	10MS	3 5X1'	659
SCSI			
127MB ELS127S	17MS	3 5X1'	219
170MB ELS170S	17MS	3 5X1'	229
240MB LPS240S	16MS	3 5X1'	269
525MB LPS525 SCSI-2	10MS	3 5X1'	658
700MB PR700 SCSI-2	10MS	3 5	799
1GB P1050S SCSI-2	10MS	3 5X1	989
1 2GB P1225S SCSI-2	10MS	3 5	1099

FUJITSU

FACTORY NEW - 5 YEAR WARRANTY

CAPACITY M/N	SPEED	SIZE	PRICE
IDE			
330MB M2622T	12MS	3 5'	$350
425MB M2623T	12MS	3 5'	479
520MB M2624T	12MS	3 5'	659
SCSI			
425MB M2623FA	11MS	3 5'	649
520MB M2624FA	11MS	3 5'	689
1 2GB M2694SA	10MS	3 5'	999
1 2GB M2266SA	14MS	FH	1079
2 0GB M2652SA	11MS	FH	1749
2 4GB M2654SA	12MS	FH	1799

Maxtor

FACTORY NEW – FULL WARRANTY

CAPACITY M/N	SPEED	SIZE	PRICE
IDE			
130MB 7131A	14MS	3 5X1'	180
213MB 7213A	15MS	3 5X1'	210
245MB 7245A	15MS	3 5'	225
345MB 7345A	15MS	3 5'	289
540MB 7540A	12MS	3 5'	789
SCSI			
130MB 7120S	15MS	3 5X1'	195
213MB 7213S	15MS	3 5X1'	249
245MB 7245S	15MS		285
345MB 7345S SCSI-2	12MS	3 5'	385
540MB MAGIK540SL	6MS	3 5X1	799
1 2GB 1240S SCSI-2	8MS	3 5'	CALL1
1 2GB PO12S	13MS	FH	979
1 7GB P117S	13MS	FH	1259

TOSHIBA

5 YEAR WARRANTY ON 3 5'
1 YEAR WARRANTY ON 2 5'

CAPACITY M/N	SPEED	SIZE	PRICE
SUPERFAST SCSI-2			
877MB MK438FB	12MS	3 5'	$839
1 2GB MK538FB	12MS	3 5'	959
200MB IDE MK2224	17MS	2 5'	429
200MB SCSI MK2224	17MS	2 5'	489
340MB IDE MK2326		2 5'	599

MICROPOLIS

FACTORY NEW – 5 YEAR WARRANTY

CAPACITY M/N	SPEED	SIZE	PRICE
IDE			
528MB 2105A	10MS	3 5'	$ 759
1GB 2112A SCSI-2	10MS	3 5'	985
SCSI			
560MB MC2105	10MS	3 5'	$ 759
870MB MC1824 SCSI-2	14MS	HH	879
689MB MC2108 SCSI-2	10MS	3 5'	899
1 2GB MC2112 SCSI-2	10MS	3 5'	985
1 2GB MC1598 SCSI-2	15MS	FH	939
1 5GB MC1528 SCSI-2	14MS	FH	939
1 6GB MC1908 SCSI-2	10MS	FH	1649
1 75GB MC2217 SCSI-2	10MS	3 5'	1449
2 0GB MC1548 SCSI-2	14MS	FH	1349
2 4GB MC1924 SCSI-2	11MS	FH	1929
3 8GB MC1936 SCSI-2	11MS	FH	2439

Seagate

CAPACITY M/N	SPEED	SIZE	PRICE
IDE			
42 8MB ST351A X	19MS	3 5X1'	$ 113
80MB ST3096A	16MS	3 5X1'	197
107MB ST3120	15MS	3 5X1'	180
130MB ST3144A	15MS	3 5X1'	165
85MB ST9100A	16MS	2 5'	299
215MB ST3243A	16MS	3 5'	199
126MB ST9144A	16MS	2 5'	279
245MB ST3283A	12MS	3 5X1'	289
260MB ST3290A	16MS	3 5X1'	249
340MB ST3385A	12MS	3 5X1'	339
340MB ST3390A	12MS	3 5'	329
209MB ST9235A	16MS	2 5'	399
452MB ST3550A	12MS	3 5X1'	475
540MB ST3600A	11MS	3 5X1'	689
540MB ST3655A	12MS	3 5'	659
SCSI			
240MB ST3283N	12MS	3 5X1'	CALL1
331MB ST1400N	12MS	3 5X1'	699
426MB ST3500N	12MS	3 5X1'	729
430MB ST1480N	14MS	3 5X1'	759
457MB ST3550N SCSI-2	12MS	3 5X1'	559
525MB ST3600N SCSI-2	11MS	3 5X1'	689
343MB ST3390N SCSI-2	12MS	3 5X1'	389
860MB ST1980N SCSI-2	12MS	3 5X1'	939
676MB ST4766N	14MS	FH	1139
665MB ST4787N	11M	FH	999
1420MB ST41850N	15MS	3 5X1'	1189
1350MB ST41600N	12MS	FH	1599
1 2GB ST11200N SCSI-2	10MS	3 5'	989
1 2GB ST41200N	14MS	FH	995
1 6GB ELITE-I	11MS	FH	1099
1 6GB ST41851	15MS	FH	1279
2 1GB ST42100N SCSI-2	14MS	FH	1449
2100MB ST42400 SCSI-2N	11MS	FH	1839
3 55GB ST43400N SCSI-2	10MS	FH	2279
2 4GB ELITE-II	11MS	FH	1999
3 4GB ELITE-III	11MS	FH	2399
1 7GB BARRACUDA-I ST11950N SCSI-2		3 5'	1799
2 1GB BARRACUDA-II ST12550N SCSI-2		3 5'	2399
2 2GB ST12400N SCSI-2	12MS	3 5'	1999

WESTERN DIGITAL

FACTORY NEW – 2 YEAR WARRANTY

CAPACITY M/N	SPEED	SIZE	PRICE
IDE			
212MB WD2200	12MS	3 5X1'	$ 205
250MB WD2250	14MS	3 5X1'	235
340MB WD2340	12MS	3 5X1'	299
420MB AC2420	13MS	3 5X1'	449

CONNER

FACTORY NEW – 1 YEAR WARRANTY

CAPACITY M/N	SPEED	SIZE	PRICE
IDE			
85MB CP30084E	17MS	3 5X1'	$ 164
120MB CP30104H	19MS	3 5X1'	159
170MB CP30174E	17MS	3 5X1'	165
212MB CP30204	12MS	3 5X1'	214
250MB CP30254H	14MS	3 5'	225
340MB CP30344	14MS	3 5X1'	299
540MB CP30544	10MS	3 5X1'	929
SCSI			
85MB CP30080E	17MS	3 5X1'	171
170MB CP30170E	17MS	3 5X1'	204
212MB CP30200	12MS	3 5X1'	279
540MB CP3540 SCSI-2	16MS	3 5'	679
1 3GB CP31370 SCSI-2	16MS	3 5	1029

INTEL CPUs

386 DX	
80386 DX/20	39
80386 DX/25	74
80386 DX/33	89
AMD DZ40	99
486DX/SX	
80486 DX/25	299
80486 DX33	369
80486 DXI50	498
80486 DX-2/50	478
80486 DX-2/66	599
80486 SX/25	179
80486 SX/20	149
80486 SX/33	249

DYNAMIC RAMS

1MB X 1-100NS	CALL!
1MB X 1-80NS	CALL1
1MB X 1-70NS	CALL!
1MB X 1-60NS	CALL!
256K X 1-150NS	CALL!
256K X 1-120NS	CALL!
256K X 1-100NS	CALL!
1 x 4-80NS DIPP	CALL!
256 X 1-80NS	CALL!
256K X 1-70NS	CALL!
256K X 1-60 NS	CALL!
256K X 4-100NS	CALL!
256K X 4-80NS	CALL!
256K X 4-70NS	CALL!
256K X 4-60NS	CALL!
64K X 4-120NS	CALL!
64K X 4-100NS	CALL!
64K X 4-80NS	CALL!
64K X 1-150NS	CALL!
64K X 1-120NS	CALL!
64K X 1-100NS	CALL!

CACHE

8 X 8-15	5.00
32 X 8-15	16.00
8 X 8-25	4.00
32 X 8-25	7.80
64 X 4-25	8.00
16 X 4-25	5.00
8 X 8-20	4.50
32 X 8-20	8.00
64 X 4-20	10.00
16 X 4-20	5.50
16 X 4-15	9.00
64 X 1-20	15.00
64 X 1-15	20.00

MATH CO-PROCESSORS

INTEL	
8087 5MHZ INTEL	49.00
8087-2 8MHZ INTEL	139.00
8087-1 10MHZ INTEL	89.00
80287-6 6MHZ INTEL	48.00
80287-8 8MHZ INTEL	49.00
80287-10 10MHZ INTEL	59.00
80287XL 10MHZ INTEL	75.00
80287XLT 12MHZ INTEL	75.00
80387SX-16 16MHZ INTEL	75.00
80387SX-20 20HZ INTEL	75.00
80387SX-25 25HZ INTEL	75.00
80387DX-16 16MHZ INTEL	75.00
80387DX-20 20MHZ INTEL	75.00
80387DX-25 25MHZ INTEL	75.00
80387DX-33 33MHZ INTEL	75.00
80487SX-25 INTEL	375.00
OVERDRIVE 5X DX33	CALL
OVERDRIVE 5X 0X25	CALL
OVERDRIVE 5X 0X20	CALL
RAPIO CAD	CALL
CYRIX	
83D87DX-16 16MHZ CYRIX	75.00
83D87DX-20 20MHZ CYRIX	75.00
83D87DX-25 25MHZ CYRIX	75.00
3D87DX-33 33MHZ CYRIX	75.00
83D87DX-40 40MHZ CYRIX	85.00
83S87SX18 16MHZ CYRIX	89.00
83S87SX20 20MHZ CYRIX	89.00
83S87SX25 25MHZ CYRIX	89.00
82S87XL CYRIX	69.00
WEITEK	
3167-20MHZ WEITEK	295.00
3167-25MHZ WEITEK	595.00
3167-33MHZ WEITEK	495.00
4167-25MHZ WEITEK	445.00
4167-33MHZ WEITEK	065.00
IIT	
2C87-8 8MHZ IIT	54.00
2C87-10 10MHZ IIT	54.00
2C87-12 12MHZ IIT	50.00
2C87-20 20MHZ IIT	64.00
3C87-16 16MHZ IIT	89.00
3C87-20 20MHZ IIT	89.00
3C87-25 25MHZ IIT	89.00
3C87-33 33MHZ IIT	89.00
3C87-40 40MHZ IIT	75.00
3S87SX-16 16MHZ IIT	69.00
3S87SX-20 20MHZ IIT	89.00
3S87SX-25 25MHZ IIT	89.00
3S87SX-33 33MHZ ITT	89.00

MOTHER BOARDS

386DX-33-64K CACHE W/CPU	$199
386DX-33-256K CACHE W/CPU	249
386DX-40-64K CACHE W/CPU	210
386DX-40-256K CACHE W/CPU	260
486SX-25-64K CACHE W/CPU	349
486DX-33-64K CACHE W/CPU	490
486DX-33-256K CACHE W/CPU	540
486DX-50-256K CACHE W/CPU	749

PROCESSOR UPGRADES

Kingston 386 & 486

Now you can use WINDOWS in enhanced mode get true multitasking & background operation for WINDDWS 3.1, DS/2 & other 386 specific hardware. Processor upgrades offer dramatically increased system performance by up to 350% & easy installation.

SX NOW! supports I8M AT and others into a 386	
25MHZ	198
33MHZ	218
SLC NOW! supports 286 PS/2, 50,50Z & 60 into a 486	
20MHZ	139
25MHZ	228
50MHZ	398
486 NOW! supports PS/2, 70, 80 & COMPAQ into 486	
DX33MHZ	638
SX25MHZ	428
MicroMaster supports all MCA PS/2 into a 486(0-16M8 memory)	
486DX33	1295
486SX25	828
AT Master supports 386SX systems from I8M & COMPAQ (0-16M8)	
486DX33	1399
486SX25	989

PS/2 HARD DRIVES

PS/2 50, 50Z, 55SX, 60, 70, 80, P70

INTERNAL DRIVE KITS - May be used as a high performance replacement or to co-exist with the original I8M drive. Compatible with DDS 3.3, 4.01, 5.0, DS/2, 2.0 and Novell. Includes IDE or SCSi-2 micro-channel controller, hard drive, mounting kit, ribbon and power cable, manual, and hardware.

106MB 15MS IDE	383
125M8 15MS IDE	414
125M8 15MS SCSI	439
200M8 15MS IDE	453
200M8 15MS SCSI	513
340M8 13MS IDE	689
340M8 13MS SCSI	869
512M8 12MS IDE	1043
512M8 12MS SCSI	1284
1 2GB 12MS SCSI	1443

PS/2 MODEL 25, 30, 30-286

INTERNAL DRIVE KITS - Includes controller, drive, mounting kit, cables and hardware. Supports DOS 5.0, Windows 3.1

42M8 HARD DRIVE KIT	189
106M8 HARD DRIVE KIT	253
125M8 HARD DRIVE KIT	284
200M8 HARD DRIVE KIT	323

MICROCHANNEL CONTROLLER

IDE	169
SCSI-2	179

IDE CONTROLLER supports all internal IDE drives. Zero slot installation for model 50 & 50Z.
SCSI-2 CONTROLLER supports 7 internal or external SCSI drives, CD Roms & Tape Backups, with 7 year warranty! Both support DOS 5 0, Windows & OS/2, compatible with existing IBM drive and controllers.

IBM

N61SX & N51SLC
2MB MOD 07G1879
4MB MOD 07G1883
8MB MOD 07G1881
L40SX, N33SK LAPTOP
2MB MOD 79F0999
4MB MOD 79F1000
8MB MOD 79F1001
P75 & P70
2MB MOD 6450902
4MB MOD 6450128
PS/1 286
512K MOD 1057035
2MB MD 92F9935
PS/1 386SK
512K MOD 1057035
2MB MOD 92F9935
4MB MOD 92F9694
PS/2 25
128K KIT 78X8955
PS/2 25 & 38 286
512K KIT 30F5348
2MB KIT 38F5360
0-16MB E-C N/A
PS/2 35SX, 35LB, 40SX
1MB MOD 6450603
2MB MOD 6450604
4MB MOD 87F9977
8MB MOD 6450129
PS/2 55SX & 55LS
1MB MOD 6450603
2MB MOD 6450604
4MB MOD 87F9977
0-16MB E-C
PS/2 57SX, M57SLC, 56SK, 55SLC, 70 & 77
2MB MOD 6450902
4MB MOD 6450128
8MB MOC 6450130
PS/2 70-061, 70-161, 121, 061, E61
1MB MOD 6450603
2MB MOD 6450604
0-32MB E-C
PS/2 70-A81, -A1S, -A21, -A61, 861, B21
2MB MOD 6450608
0-32MB E-C
PS/2-40 A16, A21, A31
4MB MOD 6451060
0-32MB E-C
MODEL 90XP & 95X
INSTALL IN PAIRS
2MB MOD 6450902
4MB MOD 6450128
8MB MOD 6450130
16 BIT EXPANSION CARD FOR MODELS 56, 40, 55SK, 85SX, 55LS MAXIMUM TWO CARDS PER MACHINE
0-16MB E-C
1MB MOD 6450603
2MB MOD 6450604
4MB MOD 87F9977
8MB MOD 6450129
32 BIT EXPANSION CARD FOR MODELS 70 & 40 MAXIMUM TWO CARDS PER MACHINE
0-32MB E-C
1MB MOD 6450603
2MB MOD 6450604
4MB MOD 87F9977
8MB MOD 6450129
4019 & 4019E
3 5MB E-C 1038675
4029
4MB MOD 118335
THINKPAD 300
2MB CRD33G9288
8MB CRD33G2989
THINKPAD 700T
8MB RCD6451167
THINKPAD 700 & 700C
2MB MOD071419
4MB MOD07G1420
8MB MOD07G1421
N45SL
2MB MOD92F8804
CL57SX LAPTOP
2MB CRD07G1419
4MB CRD07G1420
8MB CRD07G1421
PS/1 CONSULTANT 2133, G11, 61S, G14, ESSENTIAL W11, W1S, W14, VALUEPOINT 325T & EXPERT S11, S13, S14
1MB MOD6450603
2MB MOD6450608
4MB MOD6450128
8MB MOD6450130
VALUEPOINT 425SX25, 0X/33 & 0X2/66 INSTALL IN FOURS
1MB MOD96F9260
4MB MOD96F9291
PRO 386SX M21-23
2MB MOD6450902
4MB MOD6450128
8MB MOD6450138
PS/2 80-041
1MB MOD6450375
PS/2 80-081, 111, 121, 181, S11 & 321
2MB MOD6450379
MODEL 95-38 OMF, OMT ECC MODULES
4MB MOD6451158
8MB MOD6451159
XSTATION 120 & 138
1MB VRAM4201
1MB MOD6450603
2MB MOD6450604
4MB MOD34F2933
RS/6000 POWERSTATION POWERSERVER 220
4MB MOD6450128
8MB MOD6450138
RISC SYSTEM 6000 NO BOARD INCLUDED
16MB KIT 4010
32MB KIT 4033
64MB KIT 4036
PS NOTE
4MB N-A
8MB N A

COMPAQ

LTE 8088 PROCESSOR
512K MOD 117077001
LTE 286
1MB KIT 117081001
2MB KIT 117081002
4MB KIT 117081003
LTE 386S/20
4MB C-C 121125002
LTE LITE 20, 25
2MB C-C 129769001
4MB C-C 129769002
8MB C-C 129769003
16MB C-C N A
SLT/286
1MB MOD 110235001
4MB MOO 110237001
SLT 386S/20
4MB MOD 118305001
PORTABLE III
2MB KIT 107332001
INTERFACE 107808001
EXP BOARD 107811001
PORTABLE 386
1MB KIT 107651001
INTERFACE 107707001
4MB E-C 107653001
4MB AOM 107654001
PORTABLE 486C
2MB MOD 118689001
4MB MOD 118690001
8MB MOD 126877001
DESKPRO 286
2MB KIT N-A
0-16MB E-C N A
DESKPRO 286E
2MB KIT N/A
0-16MB E-C N/A
DESKPRO 386-16
1MB KIT 108371001
1MB E-C 108069001
2MN E-C 108369-71-001
4MB E-C 108070001
8MB E-C 108070-72-001
DESKPRO 386S
1MB E-C 113633001
4MB E-C 113634001
1MB MOD 113646001
4MB MOD 112534001
DESKPRO 386/20E, /25E
1MB E-C 113644001
4MB E-C 113645001
1MB MOD 113131001
4MB MOD 113132001
DESKPRO 386/33
2MB MOD 115144001
DESKPRO 386/33L, 486/33L
2MB MOD 115144001
8MB MOD 116561001
32MB MOD 116568001
6 SOCK-EC 116569001
DESKPRO 486/25, /50L
2MB MOD 115144001
8MB MOD 116561001
32MB MOD 116568001
DESKPRO 386/26M, 486/33M, 486S/16M, /25M
1MB MOD 118688001
2MB MOD 118689001
4MB MOD 118690001
8MB MOD 126877001
8 SOCK-EC 129160001
DESKPRO 286N, 386N, 386S/20N
1MB MOD 118688001
2MB MOD 118689001
4MB MOD 118680001
3 SOCK-EC 118700001
PROLINEA 3/25S, 3/25ZS
2MB KIT 141738-001
6MB KIT 141742-001
PROLINEA 4/33, 4/65i
1MB MOD 141682-001
2MB MOD 141683-001
4MB MOD 141684-001
8MB MOD 141685-001
SYSTEMPRO
2MB MOD 115144001
8MB MOD 116561001
32MB MOD 116568001
6 SOCK-EC 116569001
SYSTEMPRO/LT 386-25S, 486SX-25S
1MB MOD 118688001
2MB MOD 118689001
4MB MOD 118690001
8MB MOD 126877001
8 SOCK-EC 129183001
CONTURA 3/20, /25
2MB MOD 139497001
4MB MOD 139498001
8MB MOD 139499001
CONTURA 4/25
4MB MOD 146820001
8MB MOD 146521001
16MB MOD 146522001
DESKPRO M-SERIES
SYSTEMPRO LT 486SX/25S & 325/25SE
2-64MB BD 129183 + 689
4-64MB BD 129183 + 690
8-64MB BD 129183 + 877
SYSTEMPRO/XL
16MB KIT 136818301
32MB KIT 136817001
128MB KIT 139918001
8 SOCK-EC 139938001
PROSIGNIA
1MB MOD 118688001
2MB MOD 118689001
4MB MOD 118880001
8MB MOD 126877001
16MB MOD 139917001
32MB MOD 149147001
LITE 4/25C
2MB CRD 142337002
4MB CRD 142337003
8MB CRD 142337004

HP

HP VECTRA 386/33R - 33RI
2MB D2714A
8MB d2715A
HP VECTRA 286/12, ES12PC
2MB KIT D1354A
0-16MB E-C
386/16N, /20N
2MB KIT 02406A
8MB KIT 02404A
QS/16S, RS25PC, 20PC, 20C
2MB KIT 01354A
386/25PC, 486UPC
2MB MOD D2381A
8MB MOD D2152A
486S/20PC, 486PC, 48625T, 48633T
1MB MDD D2150A
2MB MOD D2381A
4MB MOD D2156A
8M8 MOD D215ZA
9000/370, /388, 345, 400DL 400S, 400T, 425S
8MB KIT H98229B
16MB KIT H90229D
32MB KIT H90229E
9000/425T
4MB KIT H9B229C
8MB KIT H9B229B
16MB KIT H9B229D
9000/433S
4MB KIT H9229C
9000/425E
4MB KIT A2200A
8MB KIT A2201A
16MB KIT A2202A
9000/720, /730
16MB KIT A1979A
32MBN KIT A251ZA
9000/750
16MB KIT A1979A
32MB KIT A19B7A
9000/705, /710
8MB KIT A221SA
16MB KIT A2217A
32MB KIT A2218A
X-STATION 700RX
1MB MOD C2320A
2NBN MOD C2321A
4MB MOD C2322A
8MB MOD 02152A
DESKJET 500C, 500 PLUS, 550C
256KB MOD H22707B
LASERJET II, IID
2-4 E-C H33444B
4MB E-C H33445B
LASERJET IIP, III, IIID, IIIP
2-4MB E-C H33475B
3-4MB E-C H334768
4MB E-C H33477B
LASERJET IIISI
4MB MOO C2065A
8MB MOD N A
HP-4 - 4M - 4SI - 4SIMX - XL308
1MB C2063A
2MB C2064A
4MB C2065A
8MB C2066A
HP LASERJET FAX
1MR
PAINTJET XL300
OK EXP BD
HP DESIGNJET 500 INKJET
4MB C2065A
8MB C2066A

TOSHIBA

T1000SE
1MB C-C PCPA8311U
2MB C-C PCPA8312U
T1000LE
1MB C-C PCPA8311U
2MB C-C PCPA8312U
4MB C-C PCPA2001U
8MB C-C PCPA2002U
T1000KE
1MB C-C PCPA8311U
2MB C-C PCPA6312U
T2000
1MB C-C PC1BPA8316U
2MB C-C PC18PA8317U
4MB C-C PC1XPA8314U
8MB C-C PC1XPA8315U
T2000SK
4MB C-C PC14PA8314U
8MB C-C PC14PA8315U
T2000SXE, T2200SX, T1800, T1850, T1850C
2MB C-C PCPA2000U
4MB C-C PCPA2001U
8MB C-C PCPA2002U
T3300SL
2MB C-C PCPA2006U
4MB C-C PCPA2007U
6MB C-C PCPA2008U
8MB C-C PCPA2009U
16MB C-C PCPA2010U
T4400SX, T4400SXC, T6400-C
2MB C-C PCPA2003U
4MB C-C PCPA2004U
8MB C-C PCPA2005U
16MB C-C PCPA2010U
32MB C-C N A
T1200XE
2MB MDD PC13PA8306U
T1600
2MB MOD PC8PA8302U
T3100
2MB MOD PC3PA7135E
T3100E
2MB KIT PC9PA8341U
T3100SX
2MB MOD PC15PA8308U
4MB MODPC15PA8310U
T3200
3MB MOD PC6PA7137U
T3200SX
2MB KIT PC12PA8307U
4MB KIT PC12PA8309U
T3200SXC
2MB KIT PC19PA8318U
4MB KIT PC19PA8319U
T5100, 70100C
2MB MOO PC7PA8301U
T5200, T5200C, T8500
2MB KIT PCPA8304U
8MB KIT PCPA8313U
T4500, T4500C
4MB C-C PCPA16U
8MB C-C PCPA2017U
16MB C-C N A
PAGELASER 6
2-4MB E-C NB0090
4MB E-C NB0100

Apple

POWERBOOK 100, 140, 145, 170
2MB MOD M1032LL-A
4MB MOD M1033LL-A
6MB MOO N/A
POWERBOOK 140, 180
2MB MOD N-A
4MB MOD N A
6MB MOD N-A
8MN MOO N A
10MB MDD N A
POWERBOOK 210, 230
NOTE: THERE ARE THREE TYPES OF MODULES FOR MODELS 210 & 230 "UPGRADABLE", "BASE" AND "CONVENTIONAL". BE SURE TO PURCHASE THE CORRECT ONE FOR YOUR NEEDS.
CONVENTIONAL (STANDARD)
2MB MOD N A
4MB MOD N A
6MB MOD N A
8MB MOD N A
10MB MOO N A
12MB MOD N A
BASE - WILL ACCEPT 1 UPGRADE MODULE
4MB MOD N A
8MB MOD N-A
12MB MOO N A
20MB MDD N/A
UPGRADE MODULES - INSTALL ON THE BASE MODULES
4MB MDD N A
8MB MOD N A
16MB MOD N A
MAC PORTABLE
2MB MOD N A
3MB MOD N A
4MB MOD N A
MAC PORTABLE BACKLIT
2MB MDD N A
3MB MOO N A
4MB MOO N A
IIGS
1-4MB E-C N A
MAC PLUS
2MB KIT MD219
4MB KIT MD2707
MAC CLASSIC
1-3MB E-C M6361LL-A
2MB KIT MO219
MAC CLASSIC II, LC, LCII
2MB KIT MO219
4MB KIT N A
8MB KIT N A
MAC SE
2MB KIT MO219
4MB KIT MO27007
MAC SE/30
4MB KIT MO2707
16MB KIT N A
MAC II
4MB KIT MO2707
MAC IIX
4MN KIT MO2707
16MB KIT N A
MAC LC
2MB KIT MO219
4MB KIT N A
8MB KIT N A
512K VRAM
MAC IISI, IICI
2MB MOD MD514LL-A
4MB KIT MO2707
16MB KIT N A
32MB KIT N A
64MB KIT N A
MAC IIFX
4MB KIT MO376LL-A
16MB KIT N A
64MB KIT N A
MAC IICX
4MB KIT MO2707
16MB KIT N A
32MB KIT N A
MAC QUADRA 700, 900, 950
4MB KIT MO2707
16MB KIT N A
32MB KIT N A
64MB KIT N A
QUADRA VIDEO 700,900
512K KIT M5951LLA
QUADRA VIDEO 950
512K KIT M593LLA
PERSONAL LASER WRITER LS
512K KIT 334D114
PERSONAL LASER WRITER NT
2MB KIT MO219
8MR KIT N-A
LASERWRITER IINTX, IINTXJ
1MB KIT M6005
4MB KIT M6006
LASERWRITER IIF/IIG
4MB KIT MO2727
16MB KIT N-A
LASER WRITER IINTR
2MB
MAC HVK
4MB KIT MO292LLA
16MB KIT N/A
32MB KIT N/A
64MB KIT N A
CENTRIS 610, 650, LCIII
4MB 1507LLA
8MB MA
16MB M1508LLA
32MB MA
POWERBOOK 165C
4MB NA
6MB NA
8MB NA
10MB NA
LASERWRITER SELECT 310
1MB M2093GA
4MB M22094GA

TI

TRAVELMATE WINSLC/25
2MB 256679960001
TRAVELMATE 2000
1MB 2568034001
TRAVELMATE 3000
TRAVELMATE 3000WINSK
2MB KIT 2568776001
TRAVELMATE 4000WINSK
4MB MOD 25812650001
MICROLASER PLUS, XL
MICROLASER PLUS TURBO
1MB MOD 255739001
2MB KIT N/A
4MB KIT N/A
8MB KIT N A

AST

AST PREMIUM EXEC. 286/12, 386S6/20
1MB MOD 500814001
4MB MOD 500814003
AST PREMIUM EXEC. 386S6/25, 25C, 25SL, 25SLC
4MB MOD 500814004
BRAVO 286
2MB KIT 500510002
4MB KIT 500510008
BRAVO 486/25, 4-23
2MB KIT 500718004
8MB KIT 500780001
BRAVO 3-25S
2MBK KIT 500710004
8MB KIT 500824002
BRAVO 3-33LC
2MB KIT 500962001
8MB KIT 500962002
BRAVO 386SX
2MB KIT 500510002
4MB KIT 500510008
BRAVO 386SX20
2MB KIT 500710003
8MB KIT 500824001
BRAVO425S, 433LC, 4500, 4660
ADVANTAGE PRO 4883X33, 486SX20
2MB KIT 500987001
4MB MOD 500987002
8MB KIT 500987003
16MB MOD 500987004
32MB KIT 500987005
PREMIUM II 386/25, /33, 386SX/20, 486/33, 486SX/20, PREMIUM 386SX/1S, 486/33E
PREMIUM 386/33TE, 486/33TE
1MB MOD 500780003
2MB KIT 500780005
4MB MOO 500780004
8MB KIT 500780001
- 0-32MB E-C 500818001
OFFICE ADVANTAGE 386SX/20, 486SX/20
2MB KIT 500891001
8MB KIT 500891002
PREMIUM 380
4MB 500510004
POWER PREMIUM 3/33, 4/33 & 4/500
2MB KIT 500780005
8MB KIT 500780001
PREMIUM WKST 286, 386SX
2MB KIT 500510002
4MB KIT 500510008
PREMIUM 386/1S, C
4MB KIT 500510008
PREMIUM SE 4/33
2MB KIT 500780005
8MB KIT 500780001
PREMIUM SE 4/50
16MB KIT 500928001
32MB KIT 500928002
PREMMIA
4MB 501159001
8MB 5011569002
16MB 501159003
32MB 501150004
MANHATTAN SMP
16MB 501143001
ADVANTAGE PLUS 4880X33
DX250 - OK266
4MB 500510008
8MB 500824001
AST POWER EXEC 4/25SL
4MB NA

EPSON

RB-SL/20, /25, /25C
2MB MOD A808771
4MB MOD A808781
8MB MOO N-A
N83S
4MB MOD A806511
EQUITY LT-286
1MB MOO A808191
EQUITY LT-386SK
2MB MOD A808361
EQUITY 286 PLUS
2MB KIT A808101
EQUITY 386SX/16 PLUS
2MB KIT A808101
EQUITY 386/25 PLUS, 386SK PLUS
2MB KIT A808101
EQUITY 386SX/20 PLUS
8MB KIT A808631
EQUITY 486SX/25 PLUS
2MB KIT A808101

486/33, EISA & TOWENS
2MB KIT A808591
8MB KIT A808711
16MB KIT A808673
EPL 4000 L-P
2-4MB E-C IBS401
4MB E-C N/A
EPL 7000 L-P
2-4MB E-C C822011
4MB E-C C822061
EPL 7500 L-P
2-4MB E-C C822051
4MB E-C C822021
ACTION LASER II/EPL 4000 /4100/8000/8100
1MB E-C
2MB E-C
3MB E-C
5MB E-C
EQITY 2 PLUS

NEC

ULTRALITE 286F
1MB OD PC2221
4MB MOO PC2222
ULTRALITE 86/20
2MB MOD PC4421
8MB MOD PC4422
ULTRALITE SL/20, SL/20P
6MB MOO PC4921
ULTRALITE III, SL25C
2MB MOD PC4721
4MB MOD PC4722
8MB MOD PC4723
PROSPEED 286
1MB MOD PC2121
2MB MOD PC2126
4MB MOD PC2122
PROSPEED 386
2MB MOD PC3121
8MB MOD PC3122
PROSPEED 386SX
1MB MOO PC2121
2MB MOD PC2126
4MB MOD PC2122
PROSPEED 386SX/20
1MB MOO PC4321
4MB MOD PC4322
PROSPEED 486SX, 486SX/C
1MB MOD OP4106204
4MB MOD CP4106205
POWERMATE PORTABLE SK
2MB E-C APCH751X
8MB E-C APCH753-754
POWERMATE PORTABLE PLUS
1-3MB E-C APCH750J
2-3MB E-C N/A
3MB E-C N/A
POWERTMATE 386/16, /20
4-16MB E-C N A
8-16MB E-C N A
POWERMATE SX
2MB E-C APCH655
4-8MB E-C APCH853
8MB EC N-A
POWERMATE SX PLUS
2MB E-C N/A
4-8MB E-C APC852E
8MB E-C N A
POWERMATE SX/1S
2-8MB E-C OP4108201
2MB KIT N/A
POWERMATE SX/20
2MB CPU MODULE OP4108101
2-8MB E-C OP4108102
2MB KIT N/A
POWERMATE SX/1SI, SX/20I, SX/20VI
2MB KIT OP4108103
8MB KIT OP4102101
POWERMATE 286C, 286 PLUS
1-3MB E-C APCH250K
2-3MB E-C N/A
3MB E-C N/A
POWERMATE 386/28
2MB MOD APCH655E
8MB MOD APCH656E
POWERMATE 386/25, 386SX25
2MB MOO APCH655X
8MB MOD APCH656X
8MB 8MB APCH657X
POWERMATE 386/25S
2MB KIT OP4105201
4MB KIT OP4105203
8MB KIT OP4105202
POWERMATE 386/33E, 486/25E
2MB MOD OP4105101
POWERMATE 386/33I
1MB MOD OP4106204
4MB MOD OP4106205
16MB MOO OP4106206
POWERMATE 486/33I
2MB KIT OP4108103
8MB KIT OP4102101
POWERMATE EXPRESS 486/33E, /50E
486SX/20E, /25E
POWERMATE EXPRESS TOWER 486/25TE, /33TE, /50E
486/SX25TE
1MB MOD OP4106204
4MB MOD OP4106205
16MB MOD OP4106206
SILENTWRITER MODEL 90 & 290
2MB MDD OP4892
SILENTWRITER MODEL 65
2MB MOD 9502
SILENTWRITER MODEL 2
2MR MOO 4892

EVEREX

TEMPO LX, LX20
2MB MOD N A
TEMPO CARRIER
2MB MOD N A
TEMPO 285
2MB KIT N A

TEMPO 386SX
2MB KIT N/A
4MB KIT N/A
STEP SERIES 286-12, -16, -20, 386-16 & 20
2MB KIT N/A
4MB KIT N/A
STEP SYSTEMS 386IS, 386SX/20
4MB KIT N/A
8MB KIT N/A
16MB KIT N/A
386/25, /33, SERVER 386
486/33, 486SX/20, 486EISA, SERVER 486
4MB KIT N A
16MB KIT N-A

ZENITH

MASTERSPORT 286
1MB MOD ZA2121
MASTERSPORT 386SX
2MB MOO ZA3831
MASTERSPORT386SL, 386SLE
2MB MDD ZA44
SLIMSPORT
1MB MOD ZA18095
2MR MDD ZA18064
4MB MDD ZA18071
TURBOSPORT 386
1MB MOD ZA3034ME
TURBOSPORT 386E
1MB MOD ZA3034ME
4MB MOD ZA3035ME
SUPERSPORT 286
1MB MOD 18066
SUPERSPORT 286E
1MB MOD ZA18066
2MB MOD ZA18064
4MB MOO ZA18071
SUPERSPORT BX
2MB MDD ZA18064
2MB MOD ZA18086 ALPHA
2MB MOD ZA18087 BETA
Z-286LP PLUS
2MB KIT Z6051
0-16MB E-C N A
Z-386SX, Z-386SX/20
2MB KIT Z6051
0-16MB E-C N A
Z-386/20, /20, /33, /33E
1MB MOO Z3800ME
4MB MOO Z3800MK
Z-486/33ET
4MB KIT ZA4200M2
16MB KIT ZA4200M8
Z-300, 400 SERIES Z-420SX
Z-4255X Z-433DX Z-433SX
4MB ME100
16MB ME90
Z-SERVER 425SX, 433DE, 450DE
4MB ME432
8MB ME102
16MB ME442
32MB ME92
Z-STATION 325SN - 325SR
420SEH - 420SN - 420SR - 425SH
433DEH - 433DN - 450XEN
1MB MR70
4MB ME100

ALR

ALR POWERFLEX
ALR FLEX CACHE 386SK
2MB KIT 12902000
4MB KIT 12904000
ALR BUSINESS VEISA
ALR BUSINESS VEISA ARRAY
ALR MPS
4MB KIT 12904000
16MB KIT 12916000
0-32MB E-C 12407480
ALR BUSINESS STATION
ALR POWER PRO
ALR POWER PRO ARRAY
ALR POWER PRO/MC
ALR POWER FLEX FLYER, 20CX
4MB KIT 12904000
16MB KIT 12916000
ALR POWER CACHE 486-4S6E
ALR MICROFLEX 3030
2MB KIT 12902000
4MB KIT 12904000
16MB KIT N A
32MB KIT N A
ALR FLYER 32LCT, 320T, SD32
1MB 32LCT ONLY
4MB 12901804
16MB 12904816
RANGER SERIES
4MB MOD 12928310
8MB MOD 12928316
16MB MOO N A
VENTURA NOTEBOOK 16 & 20
1MB MOD 12407983
4MB MOD 12407970

DELL COMPUTER CORPORATION

320N, 212N, 320NPLUS
1MB MOO 3133203
2MB MOD 3103204
NL20, NL25
2MB MOO 3103213
325P, 325D, 333D, 333P, 320SX, 433P, 486D, 486P
1MB MOO 3102505
4MB MOD 3102507
486D, 486P
16MB MOO 3102625
420, 425, 433, 486
450DE, 450SE, 450TE
2MB KIT 3102466
4MB KIT 3102467
8MB KIT 3102468
TE & SE ONLY
16MB KIT 3102469
32MB KIT 3102630

NOTEBOOK 325NC, 325N
2MB
433E & 425E
2MB KIT 3102389
4MB KIT 3102390
8MB KIT N/A
316SX
2MB KIT 3102349
325N, NC NOTEBOOK
2MB MOD 3103210
PERFORMANCE T,L,M, SERIES
4MB 3103325
16MB 3103327
PERFORMANCE ME SERIES
4MB 3103334
8MB 3103335
16MB 3103336
32MB 3103337

SUN

SPARCSTATION ELC
4MB MOO X1040
16MB MOO X1160
SPARCSTATION IPC
4MB KIT X104Y
16MB KIT X116Y
SPARCSTATION IPX
4MB MOO X104U
16MB MOO X116U
SPARCSTATION 2
16MB KIT X116W
SPARCSTATION 330
8MB KIT K108E
32MB KIT X134A
SPARC 1, 3/60, 80, 4/40, 40, 65
4MB KIT X104C,G,H Y
SPARC SLC (4/20)
4MB MOD X105Z
4/110
16MB KIT X116D
SPARC II, 4/40, 40, 65, 75 330, 370, 390
16MB KIT X116H,Y,WD
4/330, 4/370, 4/390
8MB KIT K108E
32MB KIT N/A
SPARC10
16MB MOD X116F
64MB KIT X164F
SPARCSERVER 630MP, 670MP, 690
64MB KIT K168A

MAGNAVOX

NOTEBOOK METALIS 286, 386SK
4MB MOD
NOTEBOOK METALIS 386SX16 & 386SX20
2MB MOO N/A
4MB MOD N/A
HS500, 300, 386SK, 20S
2MB KIT
4MB KIT
HS, PR, MK 1200, 286, HS, PR, MK 1500, MGP186
PR84CO, 386SK-1S, HS, PRSX20, HS80CO
386-20SX, HS3300, 386-33
HS486, 486SX
1MB SIMM
4MB SIMM

AT&T

SAFARI NBX/20
2MB C-C 37650
4MB C-C 37651
6286WSG
2MB KIT 37727
6386, S7386EWGS
4MB KIT 37716
6386/SX
2MB KIT 37336
0-16MB E-C N A
6386/25, /33WGS
2MB KIT 37261
STAR SERVER 486/33E
4MB KIT 37261
16MB KIT 37263
STAR SERVER 486/33S
4MB KIT 37344
16MB KIT 37345

SILICON GRAPHICS

4D/100 & -120, 40 SERIES 200, 300, 400
8MB KIT H4C08X
32MB KIT H4032X
4D/20 PERSONAL IRIS, 4D25, 4040, 4050, 4070, 4040 4085, CS/12, TURBO 12 & 18
4MB KIT H4C05B
4D/20 & 25
16MB KIT HU1C16B
IRIS CRIMSON
16MB KIT H4C16X
64MB KITR N A
4D/RX, INGIOD RPC, PERSONAL IRIS & IRIS INDIGO
8MB KIT HUC08C
32MB KIT HUC32H

Panasonic

CF-480
2MB MOO NA
6MB MOO NA
CF-170, CF-270, CF-370
1MB MDD CFBA168
4MB KIT N A
KX-P4410, KX-P4420, KX-P4430
1-4MB E-C KXP443
2-4MB E-C KXP441
3-4MB E-C N A
4MB E-C N A
KX-P4450
1MB E-C KXP440
KX-P44501
1-4MB E-C KXP443
2-4 MB E-C KXP441
3-4MB E-C N A
4MB E-C N A
KX-P4455
2MB E-C KKP4455 2

CANON

LPB-4, -4PLUS, 4LITE
1MB MOO S632240
1-2MB E-C S632230
2MB E-C N/A
LBP-8II
1-4MB E-C S631300
2-4MB E-C S631880
3MB E-C S631300
LBP-8III, -8PLUS
1-3MB E-C S632340
2-3MB E-C S632350
3MB E-C S632360

ACER

ANYWHERE 1120NK
2MB CARD 1120NX
ANYWHERE K386S, K386S1
2MB CRD N A
4MB CRD N A
1100RK, 1100LS
4MB KIT N A
1100/16SX
2MB KIT N A
4MB KIT N A
1100/20
2MB KIT 9100023008
1100/25, 33
4MB KIT 9100023804
1170, 1172, 1173, POWER 508
2MB MOD 9148623002
4MB MOD 9148623003
8MB MOO 9148623004
1200
4MB KIT 9148623002
8MB KIT 9148623003
16MB KIT 9148523004

PRINTER MEMORY

FUJITSU RX 7100, 7200N
2MB
KONICA LP3110, 3115
1MB
2MB
3MB
KYOCERA F1200S, F3300, F3300A
1-2-3-4MB
KYOCERA F820, F1000, F1000A, F3000A, F5000
1MB
CITOR-4 PLUS + 8E
1MB
CITOR CI-8
1MB
2MB
4MB
CITON CI-S
1MB
2MB
COMPAQ
PAGEMARQ 15 & 20
DATAPRODUCTS LZR650
EPSON EPL 4000, 4100, 8000, 8100
PAINTJET XL300
HP LASERJET FAX
PACKARD BELL PB9600
AT&T 593
TEC 130058, 1321C, 1323D
FACIT P6060
RCR 6435
CITON CI-5
HARRIS/3M
ATARI SLM-804PCV
OASYS
MANNESMAN TALLY 905-908
PHILLIPS NMS 1480
IBM 4079
KYOCERA S/806AT
NEC SILENTWRITER 2/560, 560P, 562P & 95
SEIKOSHA OP104, OP108
OLIVETTI PG108, PG208
SHARP JX9700, -E, -H
QMS PS800, PS1700, 825MR
OKIDATA OL810 & 410

LAPTOP & NOTEBOOK

ALTIMA LAPTOP SX
1MB MOD
2MB MOD
4MB MOD
16MB MOD
BONDWELL B310 SUPERSLIM
1MB MOD
BONDWELL B310V-B310SX
1MB MOD
4MB MOD
CHICONY 386SX
4MB MOD
CHICONY 5620
4MB MOD
CHAPLET NOTEBOOK
2MB MOO
4MB MOO
COMMODORE C286/386LT
2MB MOO
COMMODORE C386
2MB MOD
GOLDSTAR GS520 386SX/16
4MB MOO
HEWLETT PACKARD 95LX
1MB MOD
2MB MOD
HYUNDAI 386SK, NB386SC
4MB MOD
LIBREX 286 & V386SX
2MB MOD
LEADING EDGE OLT/386SX
1MB MOO
MITSUBA RINJA 286, 386SX
4MB MOD
PACKARD BELL PB286NB
4MB MOD
PACKARD BELL PB386NBX
4MB MOD
POQUET
512K MOO
1MB MOO
SAMSUNG NOTEMASTER 386S-1S
2MB MDD
4MB MOO
SAMSUNG NOTEMASTER 386S-20, 386S-25
2MB
4MB
6MB
SANYO 17NB, 18NB, 18NB6
2MB MDD
SAMPO NBSX1S
1MB MOO
2MB MDD
4MB MDD
SAMPO NBSX25
2MB MOD
4MB MOD
TANDON NB386SX
1MB MOO
4MB MDD
8MB MDD
TANDY 15/10, 20/10, 30/10
1MB
TANDY 20/20, 30/20
2MB
6MB
TULIP LAPTOP
4MB MOD
ZEOS NOTEBOOK
2MB MOD

BROTHER

HL-4, 4V, 4PS
1MB E-C MB410
2MB E-C M6420
4MB E-C MR440
HL-8, -8E, -8D, -8V
1MB E-C MB810
2MB E-C MB820
BROL1-410, BROL2-420
1MB KIT N/A
HL100V, 10PS
2MB E-C N A
4MB E-C N A

QMS

QMS-PS 410
1-4MB E-C N/A
2-4MB E-C N/A
4MB E-C N/A
QMS 816, 815MR, 815
1-6MB E-C N/A
2-6MB E-C N/A
4-5MB E-C N A
6MB E-C N A

SHARP

PC 6220
1MB MOD CE621B
JX9500PS LASER
1MB E-C JX95MJ
JX9500E, 9500H, 9700
1MB C-C N/A
1 5MB C-C N/A
2 5MB C-C N A
4MB C-C N/A

OKIDATA

OL 400
1MB E-C 70014701
2MB E-C N A
OL 800, 820
1MB E-C 70015201
2MB E-C N A
3MB E-C N A
4MB E-C N A
OL 830, 840
2MB E-C 70016501

1 X 9 $CALL 70 NS SIMMS 4 X 9 $CALL

CALL FOR LATEST PRICES

SIMM-SIPP MODULES

4MB X 9-80NS SIMM-PC	CALL	256K X 9-100NS SIMM	CALL	1MB X 9-70NS SIPP	CALL
4MB X 9-70NS SIMM	CALL	256K X 9-80NS SIMM	CALL	1MB X 9-60NS SIPP	CALL
4MB X 9-60NS SIMM	CALL	256K X 9-70NS SIMM	CALL	256K X 9-100NS SIPP	CALL
1MB X 9-100NS 9 CHIP SIMM	CALL	256K X 9-60NS SIMM	CALL	256K X 9-80NS SIPP	CALL
1MB X 9-80NS 3 CHIP SIMM	CALL	1MB X 8-80NS SIMM	CALL	256K X 9-70NS SIPP	CALL
1MB X 9-60NS 9 CHIP SIMM	CALL	1MB X 8-70NS SIMM	CALL	256K X 9-60NS SIPP	CALL
1MB X 9-70NS 3 CHIP SIMM	CALL	4MB X 8-80NS SIMM	CALL	256 X 36 – 1MB	CALL
1MB X 9-70NS 9 CHIP SIMM	CALL	4MB X 8-70NS SIMM	CALL	512 X 36 – 2MB	CALL
1MB X 9-60NS 3 CHIP SIMM	CALL	1MB X 9-100NS SIPP	CALL	1 X 36 – 4MB	CALL
1MB X 9-60NS 9 CHIP SIMM	CALL	1MB X 9-80NS SIPP	CALL	2 X 36 – 8MB	CALL
1MB X 9-53NS 3 CHIP SIMM	CALL			4 X 36 – 16MB	CALL
1MB X 9-53NS 9 CHIP SIMM	CALL				
16MB X 9-70NS SIMM	CALL				

Call for LATEST SUPER PRICES

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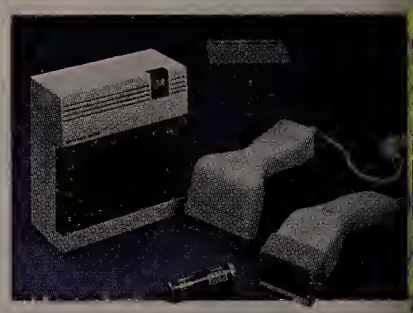

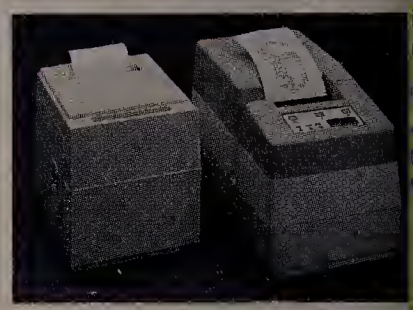

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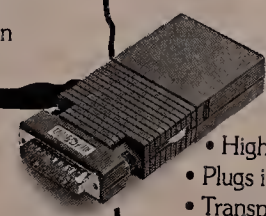

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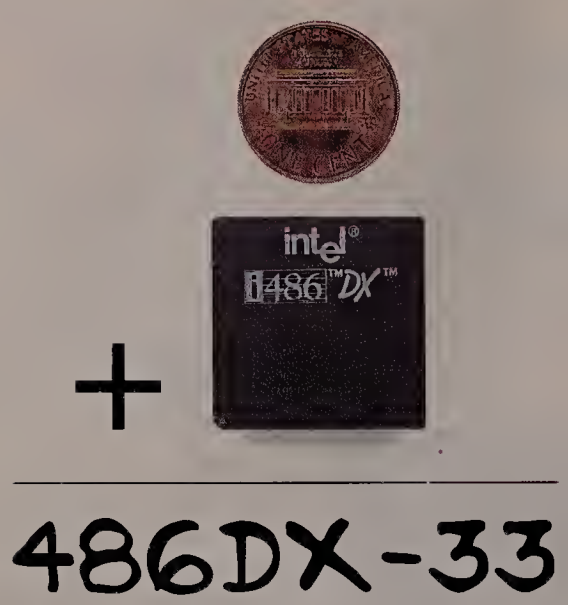

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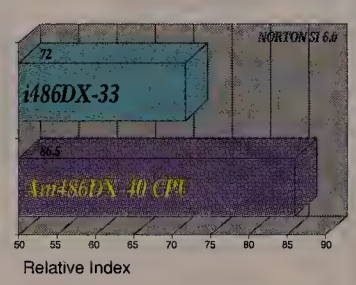

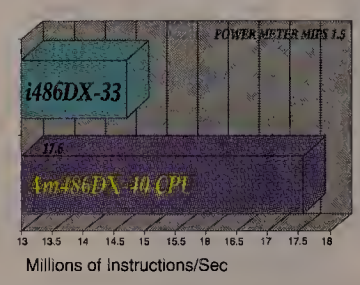

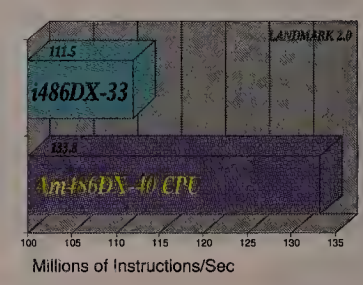

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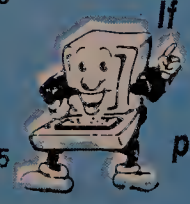

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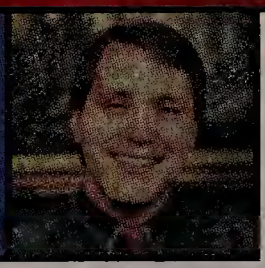

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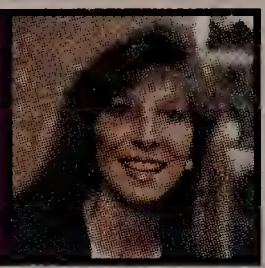

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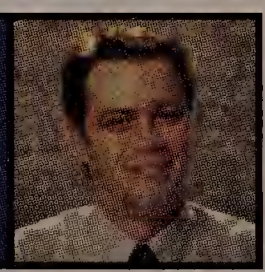

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Premium 386/33	1Meg	500718-002		59.00
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386SX20, 486-25, 25E, 33	4Meg	500780-004	WPB	219.00
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Cupid Memory Board	0-32Meg	500818-001		149.00

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MODEL	AMT. UPGRADED	AST PART #	PRICE
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DeskPro 386/33L, 486/33L	(Exp Bd)	113569-001	279.00
DeskPro 386/25, 386/20	1Meg Module	113131-001	79.00
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DeskPro 386S-16MHz	1Meg Exp Bd	113633-001	149.00
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	1Meg Module	113646-001	79.00
	4Meg Module	112534-001	229.00
DeskPro 386/20E	1Meg Exp Bd	113644-001	149.00
DeskPro 386/25E	4Meg Exp Bd	113645-001	299.00
	1Meg Module	113131-001	79.00
	4Meg Module	113132-001	229.00
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386SX/20, 386/25M, 486/33M,	2Meg Module	118689-001	89.00
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Port. 486C	8Meg Module	128877-001	429.00
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T2000SXE/2200SX/T1800, 1850, C	2Meg	PC-PA2000U	85.00
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T2000SXE/2200SX/T1800, 1850, C	8Meg	PC-PA2002U	429.00
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T4400SX, SXC T6400	8Meg	PC-PA2005U	463.00
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T4400SX, SXC,T6400	32Meg	N/A	2999.00
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AST Power Exec 3/25C, 425EL	4Meg		229.00
AST Power Exec 3/25C, 425EL	16Meg		1045.00
AST Power Exec 425SL	4Meg		239.00
AST Power Exec 425SL	16Meg		1099.00
AT&T Safari NSX/20	4Meg	PEC 37651	299.00
Bondwell B310, Plus	1Meg	28050-09100	109.00
Bondwell B310V, SX	1Meg		109.00
Bondwell B310V, SX	4Meg		229.00
Epson NB3	4Meg	A808511	219.00
Epson NB/SL 20,25,25C	2Meg	A808771	119.00
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Everex Tempo LX, LX20	2Meg	PCA 00053-0001	109.00
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Goldstar GS520 386SX/16	4Meg	S386-4M	299.00
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NEC Prospeed 286, 386SX-16	4Meg	PC21-22	219.00
NEC Prospeed 386	2Meg	PC31-21	119.00
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NEC Prospeed 386SX-20	1Meg	PC43-21	79.00
NEC Prospeed 386SX-20	4Meg	PC43-22	219.00
NEC Ultralite III/20, 20P, 25C	2Meg	PC47-21	119.00
NEC Ultralite III/SL/25C	4Meg	PC47-22	219.00
NEC Ultralite SL/20, 20P	8Meg	PC49-21	319.00
NEC Ultralite III/25C	8Meg	PC47-23	439.00
NEC Ultralite Versa	4Meg/8Meg/16Meg		299/499/1799
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TI 4000	4Meg, 16Meg		219.00, CALL
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Canon LBP-4SX	–	–	call	call	–	–	–	–	–	–	–	–
Compaq Pagemarq	–	–	–	99	–	–	195	–	–	369	–	–
Epson 6000, Action Laser	–	–	–	125	–	–	209	–	–	–	–	–
Epson Action Laser II	–	–	89	–	199	–	–	305	–	–	–	–
Epson 8000	–	–	89	–	199	–	–	305	–	–	–	–
Epson 1000	–	–	–	108	–	–	218	–	324	–	–	–
HP 2, 2D–	–	–	–	119	–	–	199	–	–	–	–	–
HP 3, 3D, 3P, 2P 2P+	–	–	–	109	–	–	189	–	–	–	–	–
HP 4, 4M, 4SI, 4SIMX	–	–	–	89	–	–	195	–	–	399	–	–
HP 4L	–	–	59	–	–	–	–	–	–	–	–	–
HP 3SI	–	–	69	–	–	–	199	–	–	399	–	–
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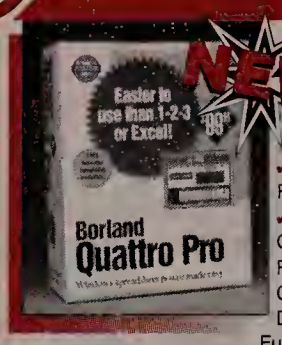

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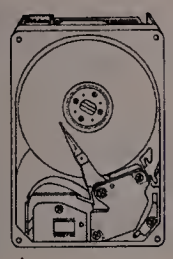

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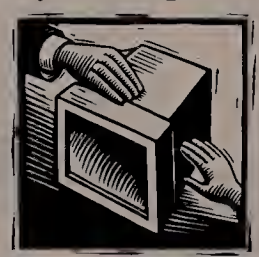

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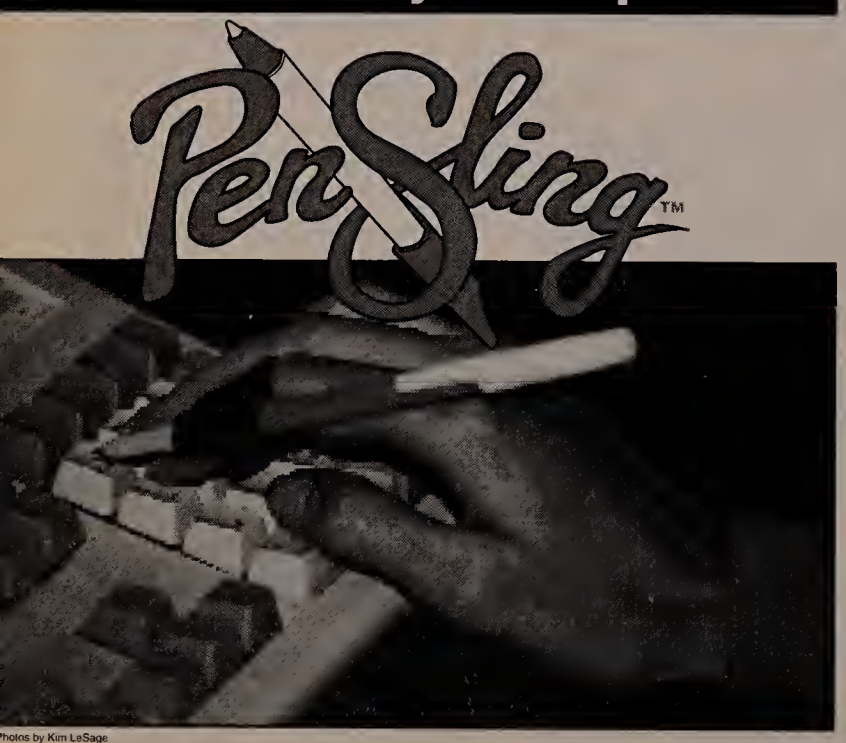

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Simulated Lawyers and Scatological Humor

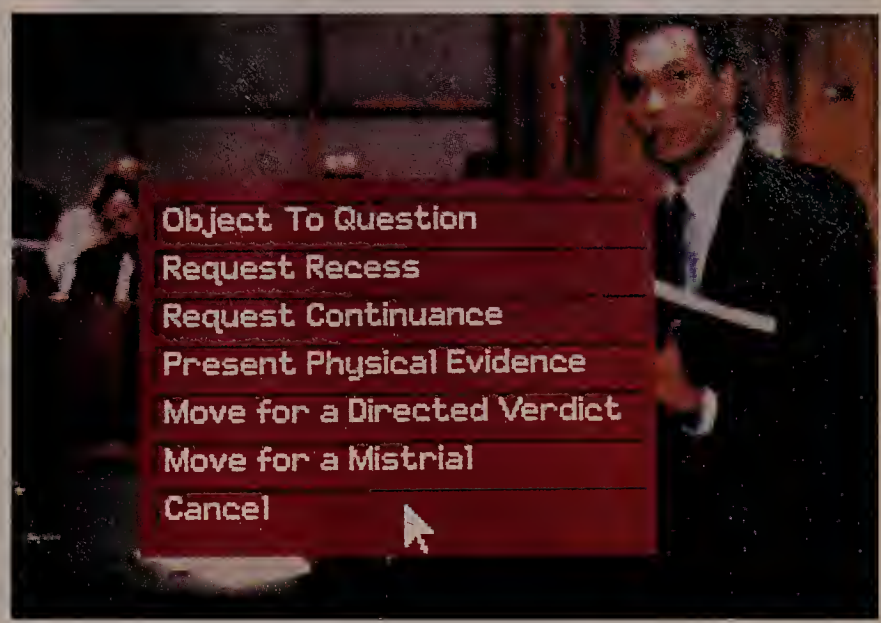
I'll spare you the obligatory lawyer joke and cut to the verdict: If you've ever felt a secret, shameful, irresistible urge to actually *join* the law firm of MeKenzie Brackman (as opposed to just watching it on TV), here's your chance.

Capstone's PC version of the long-running *LA Law* series is a surprisingly sophisticated legal simulator and a highly challenging battle of wits. To win, you must first gather the facts necessary to take your case to trial—and then present the information convincingly to a judge and jury. You will also have to remember the tenet of McKenzie Brackman: Get that bread, or else you're dead.

The game plays out through a series of high-resolution photo images that fade in, fade out, and scroll across your screen at an engagingly rapid clip. You use the mouse to interact with the other characters and choose physical destinations and lines of conversation from a series of ever-changing menus. For instance, if you attempt to interview your client without checking any of the facts, you may be limited to only two queries. But if you do your legwork, you should be able to choose from a long list of complicated questions.

Your investigative options are abundant. You can consult with your fellow lawyers, hit the books in the law library, hire a private investigator, chat with the prosecuting attorney, visit the police station and the medical examiner's office, and talk to witnesses on the phone or have them come in for interviews. In every case, your lines of inquiry will be limited by on-screen dialog menus, but this may help direct your research.

Once you think you know who's lying and who's telling the truth, you can take your case to court. Here, too, your options are affected by your research. If you've done your homework, you'll have a variety of legal tactics at your disposal. Be careful, though: You can possess all the facts and still fail to convince the jury if you ask the wrong questions—or even the right ones in the wrong order.



Use your mouse to thread the maze of legal options in LA Law. But where's the menu choice for 'send huge bill to client'?

There are eight cases, which you must play in order, and you can take the role of Victor Sifuentes, Abby Perkins (although neither is with the show anymore), or Jonathan Rollins. Music and sound effects add to the realism, but you'll need a sound card to hear the musical score.

Okay, I lied. Here's the lawyer joke: An attorney offers to sell his soul to the devil for a favorable verdict in a tough jury trial. "Certainly," says the devil, "but I want the souls of your mother, your wife, and your kids, too." "Sure, no problem," says the lawyer. "But where's the catch?"

Happily, there's no catch to LA Law—except, perhaps, that you'll never get to spend any of the money your clients have to cough up.

Weird Ed and the Time-Traveling Porta-Potties

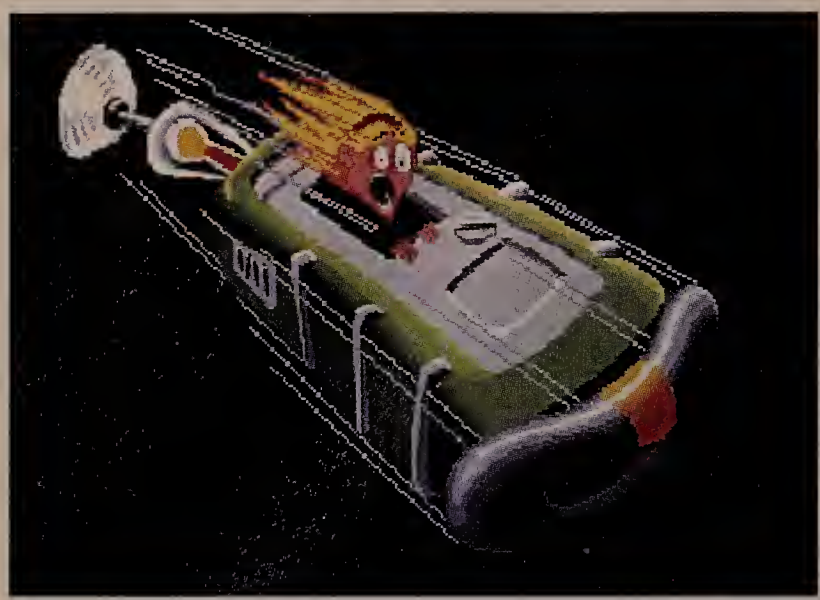
Maniac Mansion was the first release from start-up LucasFilm Games about five years back. It turned out to be such a huge hit that it put the company on the bit map. MM's designer, Ron Gilbert, went on to create two of the most charming computer games I've ever played: Monkey Island and its equally amusing sequel, Monkey Island 2.

Maniac Mansion was also one of the first adventure games to provide truly responsive graphics. Despite crude animation and a slightly backward interface, MM was a welcome improvement over what gamesters were used to. And it had one truly innovative feature: You could switch back and forth among three playable characters. If Bernard was trapped in a dark room, you could send Wendy (who had the flashlight) to his rescue.

At last, a major sequel to MM has arrived: Day of the Tentacle. Some things haven't changed. DOTT sends you back to the Mansion, at least in the beginning, and you'll still be switching among three fun-loving teenage protagonists. But you'll find huge improvements on every other level: hotshot animation in classic fifties style (think of Chuck Jones' Road Runner cartoons), the same state-of-the-art interface as Monkey Island, a time-travel gimmick that provides huge fun (and lets you steal George Washington's false teeth), and a generous helping of witty dialogue and whimsical gags. If you find your way up to Weird Ed's room and click on his ancient computer, you can even play the original Maniac Mansion!

As you might guess from all the gags, most of the Monkey Island team worked on DOTT. And while its irreverent sense of humor is precisely to my taste, it may not be to yours. If you're

By Michael Goodwin



LAVERNE'S MED SCHOOL TRAINING HAS NOT PREPARED HER for this joyride in Dr. Fred's time machine in Day of the Tentacle.

offended by a Chron-o-John time machine that looks and behaves exactly like a porta-potty, you might prefer spending your gaming time with SimLife or Front Page Sports. Even the characters—a nerd, a heavy-metal roadie, and a dizzy female med student—may try some players' patience.

Moreover, this game is tough. Often the solution to a problem is anything but obvious. While DOTT's sense of humor makes it fun to make mistakes, you may reach a point where you'd rather just move on to the next level. Fortunately, an excellent hint book is available.

Sound effects and music add to the fun, but you'll need a sound board to hear them at their best. And if you have a CD ROM drive, you should probably drop the extra $10 for the multimedia version, which features dialogue spoken by a crew of professional actors, as well as a free hint book.

Now at the International House of Mojo

Speaking of Monkey Island... From the boogalooing monkeys who interrupt the opening credits of Monkey Island 2 to the mysterious voodoo events that transpire at the International House of Mojo, this sequel is even funnier than its predecessor. The dreaded Pirate Captain Le Chuck isn't dead after all—and now he's out for revenge. Your assignment: Find the legendary treasure of Big Whoop, and stay alive to spend it. If you missed the fun the first time around, don't hesitate to pick up part two. This marvelous comedy-adventure is totally self contained.

- **LA Law** $59.95; Capstone; 800/468-7226, 305/591-5900
  Reader service no. 642
- **Maniac Mansion 2: Day of the Tentacle** floppy version $59.95, CD ROM version $69.95; LucasArts Entertainment; 800/782-7927, 415/721-3394
  Reader service no. 643
- **Monkey Island 2: Le Chuck's Revenge** $34.95; LucasArts Entertainment; 800/782-7927, 415/721-3394
  Reader service no. 644

Michael Goodwin is a contributing editor for PC World. *He can be reached on PC World Online (see page 10 for contact information).* ■

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Our December issue's crop of 486 PCs proves that low price doesn't have to mean low performance. We review more than 25 units running the gamut of chips, from 486DX2-66s to 486SX-25s. You'll be surprised at just how much power you can get from systems starting at $1400.

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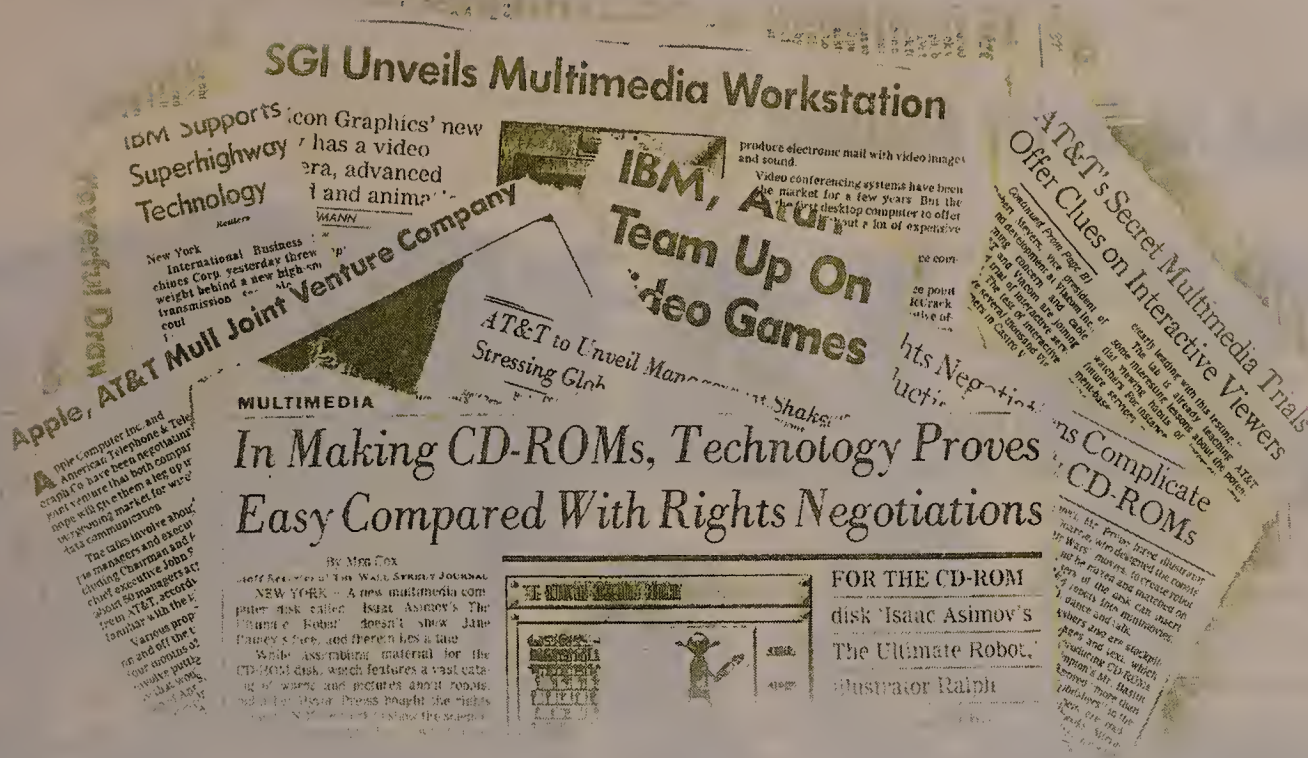

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Quick Dialing for Faster Business

I spend a lot of time on the phone. If I'm not shmoozing with an editor or discussing a project with a client, I'm chatting with a product manager about the latest and greatest hardware and software. To make every second on the phone as productive as possible, I've spent the last few months playing with programs (and some hardware) designed to make calling easier and more efficient.

Over the years I've paid attention to how I receive calls. It was pretty typical: I'd grab the phone's handset, stick it between my ear and shoulder, and scrunch it in place. If it was my editor calling, I'd take some notes, clicking away at the keyboard, if only to impress him. Unfortunately, at day's end I had an impressed editor but a sore neck.

I solved the problem with a headset, the one desktop accessory I can't live without. The $99.95 Plantronics CompuSet is small—about 3½ inches long—and, with no headband, unobtrusive. It fits in my ear (there's a model that loops over the ear) and weighs half an ounce. I can take it with me on the road, connect it to my notebook's modem, and dial the phone. Sort of a portable world headquarters. • *CompuSet $99.95; Plantronics; 800/544-4660, 408/426-5858. Reader service no. 602*

Ergonomics aside, I still felt stuck in the Stone Age when I had to pick up the phone and punch buttons to make outgoing calls—especially with a perfectly good keyboard in front of me.

So I started using a dialer. Good dialers, like useful utilities, are hard to find. A good one should log calls, including duration, phone number, and the person or company called, and occasionally let you scribble a few notes. The dialer needs to have the intelligence to let you dial manually, using the keyboard's number pad. And it needs to know when you're using a calling card, whether the call's local, and whether you need to use a prefix number—for example, dialing nine from a hotel room.

The Windows Phone Booth

On the Windows front, the best of the bunch is the dialer module of DeskTop Set. The dialer's amazing, if only because it offers over 14 dialing methods, for local, prefix, suffix, international, and extension numbers, to name a few. But there's more: It's smart enough to handle MCI, Sprint, and AT&T calling cards and works with touch-tone applications such as voice mail, bank-by-phone services, and paging. You can log calls as personal, business, or billable, and the program keeps track of how long you talk. You can also attach files to a person's name. When I call my editor, I attach the files for my columns to his name so I'm ready for questions.

The dialer is just one of a series of modules from Okna, all of which are worth checking out. For $89, you get a full-blown personal information manager including a calendar, scheduler, phone book, to-do list, and notepad. You can download the Junior version of DeskTop Set from PC World Online (as DTBOOK.ZIP, DTHELP.ZIP, DTCAL.ZIP, and DTOKNA.ZIP). • *DeskTop Set Junior free ($89 for full version); Okna Corp.; 201/909-8600. Reader service no. 604*

Dialing for DOS

HotLine is a $69.95 DOS dialer that's been around forever and does everything I want. Plus it includes American Business Edition, a database with over 10,000 business phone numbers for major corporations, airlines, hotels, and others, plus an additional database of 115,000 toll-free numbers. Both save me lots of look-up time. Importing and exporting to the database is a snap because it uses an Xbase format. HotLine's Windows version should be available by the time you read this. • *HotLine $69.95; Smith Micro Software; 800/964-7674, 714/362-5800. Reader service no. 606*

For a lot less money there's EasyDial, a $20 shareware bargain. Though not as sophisticated as HotLine, it does a stellar job of storing and retrieving phone numbers and lets you time calls and add short comments to a log. It copes well with credit card numbers and prefixes, adding pauses when needed and ignoring local area codes. If you make lots of long-distance calls, download a copy of SmartPhone, a rich resource of over 340 area and country codes, plus all U.S. ZIP codes and time zones. Both are available on PC World Online (as ED44.ZIP and SP120.ZIP, respectively). • *EasyDial $20; Patri-Soft; 909/352-2820, 909/352-1527 (fax), 909/352-2825 (BBS). Reader service no. 605* • *SmartPhone $17; Pinnacle Software; 800/995-1605, 514/345-9578, 514/345-8654 (BBS). Reader service no. 607*

ADAM COHEN

Contributing Editor Steve Bass is the president of the Pasadena IBM Users Group. He can be reached on PC World Online (see page 10 for contact information).

By Steve Bass

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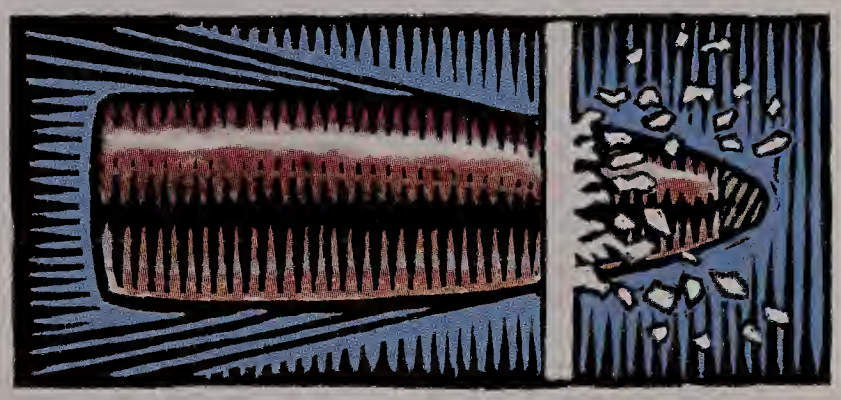
(For systems and configurations, see back cover.)



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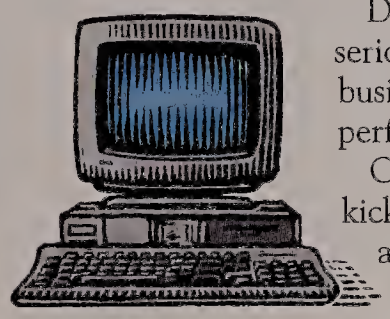

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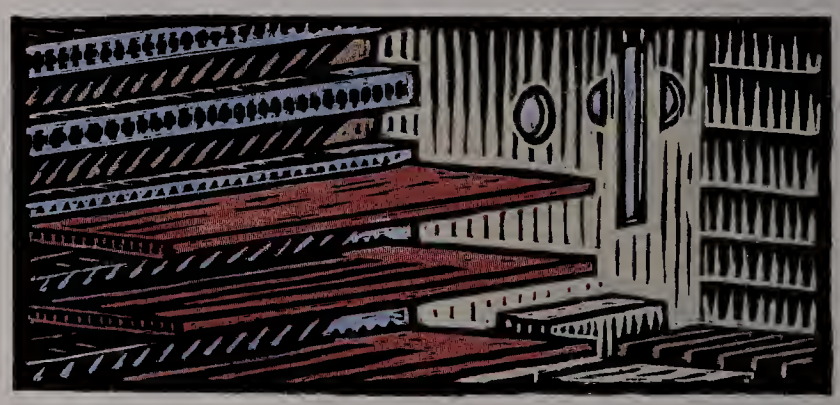

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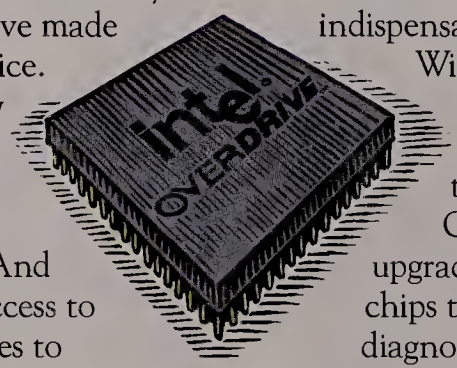

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